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defining a disaster

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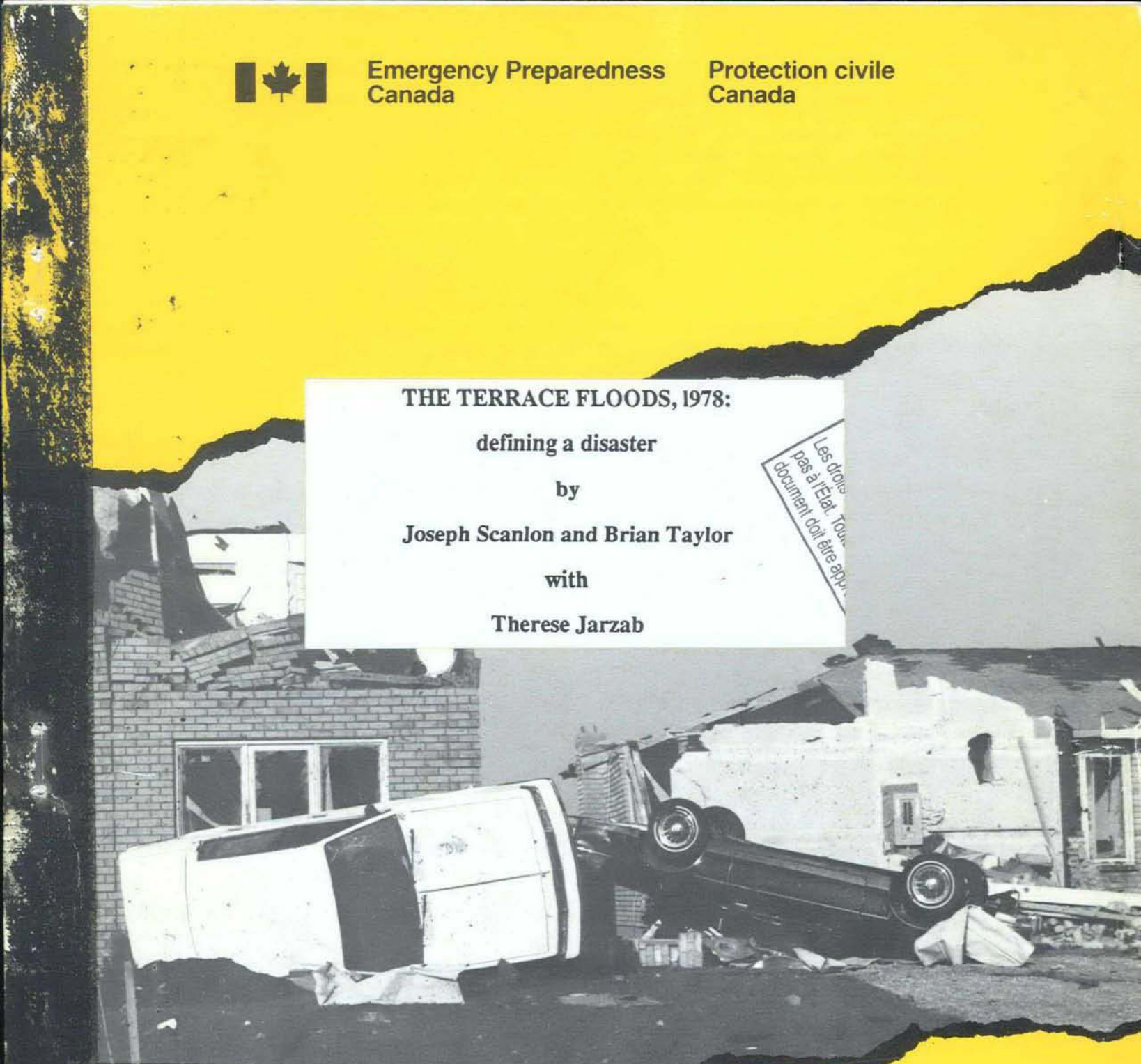

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The Terrace Floods, 1978:
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A study of some aspects of the response to severe floods which affected the Terrace area of north-west British Columbia in autumn, 1978.

The Terrace Floods, 1978:
Defining a Disaster

Preface

This report is the latest in a series of studies of emergency situations by the Emergency Communications Research Unit (ECRU) at Carleton University in Ottawa, Canada. It deals with the sudden and severe floods that hit the area around Terrace, British Columbia in Autumn, 1978. It focuses on the floods' effects, the response to them (especially in terms of communications), and the way they were reported by the media.

During the past nine years, ECRU has covered a range of unexected events in all parts of Canada. It has studied a snow emergency and a fire in Newfoundland, a windstorm in Nova Scotia, a hostage incident in New Brunswick. It has looked at a news event, a murder, a building explosion and two snowstorms in Ontario. It has examined a high-rise fire and a murder and hostage incident in Manitoba. It has done one previous study in British Columbia -- a mudslide and the subsequent evacuation of a small community.

The purpose of this research is to increase -- in Canadian terms -- the understanding of how people identify, pass on the news of and react to emergency situations of various kinds.

Data from past ECRU studies now appear in several books and in more than a dozen monographs. The research findings have also been presented to seminars and conferences at such diverse places as Ottawa, Toronto and Arnprior in Canada, San Diego, Houston and Washington in the United States, Canberra in Australia and Uppsala in Sweden. Publications of ECRU data have appeared in Australia, Greece, the Netherlands, the United Kingdom, the United States and Canada.

More important, perhaps, than formal publications or academic papers, is the fact that ECRU's findings are incorporated immediately into lectures for health, welfare and municipal officials at the Federal Study Centre in Arnprior, at the Canadian Police College in Ottawa and at the Hospital Organization &

Management course at the University of Manitoba. Long before this document was finished, many of the findings were being used in lectures and -- in this case -- in a major presentation to a seminar sponsored by the National Research Council of the United States. (The material is to come out as part of an N.R.C. report this fall.)

Although in its early years ECRU obtained its funding from Carleton University and the Defence Research Board, in recent years the bulk of ECRU's financial support has come from the federal crisis agency, Emergency Planning Canada. But, while EPC has made ECRU's existence possible, EPC is not responsible for ECRU's findings. ECRU is an independent research unit, sometimes fiercely so. The responsibility for the accuracy of the results rests with ECRU.

It will be evident from a reading of this report that hundreds of individuals and organizations helped in its preparation. Some of these were individuals who happened to show up in a sample taken in seven different British Columbia settlements. Others were officials of various involved organizations.

It should be obvious that all these people -- especially those in official capacities -- exposed themselves by their co-operation to the possibility of being second-guessed. We believe that these people did this so that others might learn from their experience.

Usually, ECRU research is done during or immediately after the incident. (ECRU team members were in Port Alice, B.C. while the town was still mostly evacuated. They were in Oak Lake, Manitoba for four days while a hostage incident continued.)

This rapid movement and early arrival has a number of advantages. It means ECRU team members can see for themselves some of what has happened, and interviews can be conducted before memories fade or accounts are coalesced and behavior is rationalized. It means ECRU is there while the incident is

still the most important thing on the minds of those who are involved.

This study, however, was done some weeks after the incident had taken place. There were still a few problems -- the rail service was still out -- but most of the difficulties were over.

Since so much had happened, this meant that to some extent memories had been blurred. Some specific details -- who said what to whom when, who did what when -- had gone. In some cases, it was difficult to sort out the confusion.

This study, therefore, may lack some of the precision associated with earlier ECRU research. The kind of precise communication chains reported in The Port Alice Slide are not present.

But there were advantages.

The delayed arrival meant that for the first time ECRU got a somewhat different, retrospective view of the disaster. It meant that for the first time ECRU could take a somewhat longer term view of what happened --looking back, for example, at overall and persistent economic effects. It meant ECRU could see some of the slower recovery activities rather than just the impact and initial response.

This led, to give just one example, to a decision by ECRU to present some original hypotheses about the economic effects of disaster, effects which we expect to test in future research. These effects -- quite simply that some people lose, some gain, some get aid, some don't, some effects are reported, some are not -- have not been noticed in previsou ECRU research, perhaps because of the concern with the immediate. (They do not appear in other research either.)

One further point. It will become obvious, in reading this report, that there was some debate in Terrace as to whether the Terrace floods, 1978,

were really a disaster at least in human terms.

No one contends that streams did not overrun their banks. No one suggests bridges were not washed away. No one argues the railway was not put out of action or the natural gas pipeline broken. No one suggests that communities were not isolated.

What some people do suggest, however, is that those places hit by the actual flooding and/or isolation are places that regularly experience such problems, that the people who live there are used to such things and cope with them as normal, that the disaster -- at least in human terms -- was within normal or expected experience. Isolation, for example, is a way of life for many in the Terrace area.

These people further suggest that if this is true then the disaster response -- in terms of human needs -- did not need to be substantial or co-ordinated.

The argument has a great deal of logic to it and it should be kept in mind while reading this report. It was its presence -- and our agreement that it has some merit -- that led to the subtitle of this report: Defining A Disaster.

Finally, we should like to note that this study -- this has always been true for ECRU -- was done entirely by volunteers. No one involved in the field research -- neither the faculty nor the students -- was paid for taking part. The 15 students -- all from the School of Journalism at Carleton -- gave up more than two weeks of class time for no pay and no academic credit.

The problems discussed in this report deal with an area of northwest British Columbia focused around Terrace, a city of 11,000.

In some ways, Terrace is the hub or central city of B.C.'s Pacific northwest.

To its west, at the mouth of the Skeena River, lies B.C.'s northern Pacific harbor, Prince Rupert. Due south, on an inlet, is the aluminum city of Kitimat. To the east is Smithers and the growing business community of Prince George.

All three of Terrace's major neighbors -- Prince Rupert, Kitimat and Prince George have their own connections to the outside. Prince Rupert and Kitimat can be reached by sea. Prince George is tied to the rest of B.C. and Canada by road and rail.

But communications among these communities is via Terrace. From Prince Rupert to Kitimat or Prince George -- by road or rail -- is via Terrace. From Kitimat to Prince Rupert or Prince George, it is the same. And from Prince George to either Kitimat or the harbor at Prince Rupert, the route is via Terrace.

If the links to Terrace are cut, then both Kitimat and Prince Rupert are cut -- by road and rail -- to the interior. And, equally important, Prince George is cut off from easy access to the Pacific.

Terrace itself is also an important service community to a number of smaller communities surrounding it. It provides the major shopping centre, medical centre, educational centre. Media services -- radio, television and print -- come from Terrace to the surrounding area.

Terrace is also the police centre for the surrounding area. The R.C.M.P. detachment at Terrace provides both municipal policing and regional service

to the many smaller communities to the west, south, east and north.

The Weather

Because of its relatively northern location, Terrace, about 700 kilometers northwest of Vancouver, experiences snow each year during the autumn. By late October in 1978, the city itself was relatively free of snow but about 15 centimeters had accumulated on the mountains that surround the city.

Snow alone does not usually pose severe problems -- though occasionally slides close the rail line and highway -- but in autumn, 1978, the snow was the first step toward the problems that followed.

As the end of October approached, the weather around Terrace became unusually warm. Until then, each night the temperature had been dipping below freezing. Starting on Sunday, October 29, the temperature remained somewhat higher. From that Sunday until Wednesday, November 8th -- 10 days later -- the thermometer never -- night or day -- dipped below zero celsius.

The long warm spell meant that the accumulated snow began to melt as the freeze line -- the point above which water freezes -- slowly rose. The mountain streams began to carry the melted water down toward the Skeena en route to the sea.

Snow and warm weather alone would not have been enough to cause difficulties. But, one day after the warm spell began, the rain came as well.

It started with just a trace at 4 p.m. Monday, October 30, hardly enough to worry about. But, one hour later, it was falling at the rate of one millimeter an hour. And that build-up continued. First, it was two millimeters per hour. Then three. Then four. And it kept coming and coming.

Between 7 and 8 a.m. the following morning -- Tuesday, October 31 (Hallowe'en) -- 9.6 millimeters fell in a single hour.

In the 24-hour period between 10 p.m. Monday and 10 p.m. Tuesday, Terrace experienced 114.8 millimeters of rain, an all-time 24-hour record.

And the rain continued.

The following 24 hours -- 10 p.m. Tuesday until 10 p.m. Wednesday -- there was another 89.1 millimeters, enough for a record for one day in October except for the previous day.

In 48 hours, Terrace had 203.9 millimeters of rain -- more in each day than it had ever had before in a 24-hour period in October.

That rain, joining the melted snow, gradually then rapidly filled up the mountain streams forcing some of them to overflow or change their course. It also flowed down these streams into the Skeena and Lakelse Lake (15 kilometers south of Terrace) bringing the river and lake close to spring flood levels.

Although complete data on water flow is not available some of the data that is available illustrates how rapidly the situation developed.

One mountain river, the Zymagotitz, (known locally as the Zymacord), normally flows at 573 cubic feet per second in November. It hit 18,700 cubic feet per second on Wednesday, November 1st at 9:30 a.m.

The following day, the Skeena itself, instead of flowing at its usual November rate of 19,500 cubic feet per second had swollen to 150,000 cubic feet per second. It was barely below flood level right at Terrace. (The city is

strung along the north shore of the river.)

Finally, in addition to snow, warm temperatures and rain, there was another problem -- the wind.

It began in the nighttime hours on Monday, well before the rain. At 3 a.m. Monday it was blowing at 14 miles per hour. By 10 a.m. it was 23 miles per hour. At 3 p.m., an hour or so before the rain started, it hit 31 miles per hour. It never dropped below 20 miles per hour until the following morning -- Hallowe'en - when it subsided for 24 hours.

Then on Wednesday, November 1st, it began to blow again.

It was hardly perceptible at 7 a.m. Wednesday but by 8 a.m. it was blowing steadily at 34 miles per hour, gusting to 50. That sort of wind condition continued all day, hitting a peak of 35 miles per hour gusting to 52 at five o'clock Wednesday afternoon.

Overall Effects

The wind was really not the final touch to the problems that hit Terrace and area. The wind actually created the first problem: on Monday, as a result of the wind, there were trees down in Terrace itself and in some of the surrounding communities.

Some of these trees hit phone and power lines, knocking out some services in the area.

In Terrace power was out for two hours that Monday night. In nearby Lakelse Lake, a community of 75 families, it was out for five hours.

And the phone service was cut to Cedarvale, a hamlet of 10 families on the opposite side of the Skeena from highway 16, the Yellowhead highway. (Cedarvale is actually a two-part community: one part is across the Skeena, the other just off the main highway.)

By the following morning, Tuesday, October 31st, the melting snow, the rain and the flooding that resulted began to make themselves felt.

At 8:15 a.m., there was a mudslide along the main highway, 25 miles east of Terrace. A few hours later, one of the roads into Lakelse Lake began to wash out. By 1:15 p.m. that same day, 200 feet of road in the Lakelse Lake area were gone and another 200 feet were reduced to a single lane.

At 3:30 p.m. Tuesday, the Kitimat Village road -- Kitimat is 60 kilometers south of Terrace -- washed out as well. (The village is a native community just at the outskirts of Kitimat.) That washout took out the first of what was to be many bridges.

A few minutes later -- though it wasn't reported at the time -- a passenger train hit a rock and derailed. Main line rail traffic was blocked. The

passengers had to be returned to Kitwanga (just west of Cedarvale) then bussed to their destinations. One of those aboard said it felt as if the train had hit a "moose", a not uncommon occurrence in that area.

By late that day, the problems had reached other areas as well. At Greenville, a native village well to the north, a mountain creek had begun to flood and a bridge there had been washed out, too.

The problems, of course, were not confined to the settled areas.

Terrace is surrounded by logging roads and logging camps and, as the day wore on, these operations ran into increasing difficulties. Roads were washed out. Power poles were undermined. Logs began to wash away.

One by one, the logging companies began to shut down their operations, laying off their workers and sending them home.

Even as the camps were closing, residents of Rosswood, a community strung along a logging road north of Terrace, began to worry about the growing effects of the storm.

One parent headed into town and convinced a school principal that children from the town should be sent home early. The bus did make it but only by taking an alternative route. Even as it travelled the children at the rear could see that road covered with streams of water.

That night -- as reported later -- Hallowe'en celebrations in Rosswood were sharply curtailed.

The more dramatic problems -- the ones which caught media attention -- began to build up later that night and during the following day.

During the night on Tuesday, residents of Lakelse Lake could hear the rain

pounding on aluminum roofs and, sometimes, the water rushing down the new course of mountain streams. (Sometimes, later, it was hard to match stories because a stream would have changed its course several times making it seem as if one person or another was confused.)

Early Wednesday morning, one resident of Lakelse Lake called the local radio station in Terrace to report that the problems were serious. The station called the R.C.M.P. detachment and the detachment, after checking, decided to respond.

That call, followed up by R.C.M.P. action, led to the first emergency response to the Terrace floods. Before the morning was out, it had resulted in a search and rescue unit being active at Lakelse Lake and a call to Prince Rupert (relayed to Victoria) for an official account number for a Provincial Emergency Program (PEP) response. (The account number guaranteed volunteers protection through programs such as workmans' compensation.)

During the day, the response-gradually stepped up.

By noon, the local Terrace PEP co-ordinator, the volunteer fire chief, and some R.C.M.P. were in New Remo, a settlement to the west of Terrace, warning persons there of the dangers of flooding. (The warnings were for real: the community experienced serious flooding Wednesday night.)

Late Wednesday and on into Thursday, the situation gradually changed from one of potential danger into one in which the destruction had become of major proportions.

On Wednesday afternoon, the highway was hit by washout after washout and some of the main bridges -- structures of concrete and steel -- began to wash away.

On Wednesday as well, the rail line experienced a series of small slides and

washouts.

On Wednesday evening, the natural gas pipeline was broken in two places.

Finally, early Thursday morning a road bed on the main rail line gave way washing two parts of a train into the Skeena river, trapping two men, one of them already injured, taking their lives.

(Up until that point there had been no fatalities in the Terrace area and a handful of injuries, just one of them -- a broken neck -- serious.)

By Thursday morning, then, the Terrace area -- the hub of that part of British Columbia -- was badly battered. The road and rail systems were out in all directions. And one of the main fuel systems -- natural gas -- had been cut.

In addition, the streams of water had, in some cases, flooded a number of the smaller communities, forcing residents to flee or seek high ground, or, in other cases, isolated these communities from their neighbors and/or from Terrace.

Finally, the many breaks in the highways had trapped travellers all along the route.

The Terrace area was very much a collection of islands -- parts of communities, parts of road -- each with its own permanent or temporary resident population.

Warnings?

It might be expected that a build-up of such severe weather would have led to some sort of warning system, tying together the various emergency response agencies, and calling attention to the danger of flash flooding in the smaller communities.

This did not happen. There appear to be a number of reasons why.

First, Environment Canada predicts the weather but does not normally interpret it in the form of such things as flood warnings. And, in any case, there are no meteorologists in the Terrace area. Only on Friday -- after most of the major incidents had occurred -- did Environment Canada actually issue any warning. And that warning came not from Terrace but from a meteorologist in Vancouver.

Throughout the build-up period, Environment Canada issued only its regular forecasts (prepared in Vancouver) for the Terrace area. No specific warnings were issued for Terrace and surroundings.

During the early hours of Wednesday morning, this data was not sufficient to alarm a police officer who dropped into the airport to see how things were going. Though he was to be active in search and rescue operations at Lakelse Lake a few hours later, he left the airport unconcerned about the situation.

Second, while there is a flood warning system in British Columbia it is a system designed for spring rather than autumn use and it is especially tied to the Fraser rather than the Skeena river. This system was not in operation around Terrace in the fall.

Third, the local emergency co-ordinator is located in Terrace and is an official of the municipal government. He is responsible for emergency planning for

the city but not for the Terrace region. There is no designated regional emergency co-ordinator. As it happened, the nearest provincial co-ordinator, at Prince Rupert, was away.

On Tuesday, the day before things became really serious, the co-ordinator had discussed the situation with a regional administrator. (The administrator was worried about flooding.) The local person told the regional administrator to call Prince Rupert. When the administrator discovered the person in Prince Rupert was away, he went no further.

This does not mean the city co-ordinator was inactive. He was continually keeping an eye on the level of the Skeena river at Terrace itself. His concern was that Terrace might be hit by a flood.

As it turned out, Terrace was <u>not</u> hit and the regular watch at Terrace -- done almost every hour during the peak danger period -- suggested that this would in fact be the case. PEP therefore did not respond because Terrace was not threatened.

The third reason no overall warning was given -- and an important one, was that the various agencies that ran into flood-related problems -- the telephone company, the power company, the gas company, the railway -- all saw these problems as ones they could deal with themselves. They treated the disaster as an incident requiring individual agency response often not even passing to each other -- or to any central agency -- information about what was happening.

This problem is discussed in detail later but one anecdote illustrates the extent of this isolation: the fact a passenger train was derailed on Tuesday was not passed on to any other agency, even to the police. It was not, therefore, part of the general knowledge of what was happening. With the ever present danger of slides, the railway did not perceive it as abnormal.

These general problems of communication are discussed later in this report. First, however, it makes sense to look at what happened in some detail so the discussion will have some meaning.

The next section of this report deals with the problems that faced individual agencies -- power, telephone, gas, railway, highway. Then there is a look at the problems of individual communities, including Terrace itself.

At that point, with what happened well documented, the report takes a look at the key response agencies -- the R.C.M.P., PEP, and the vehicle that proved to be crucial to the entire response -- the helicopter.

Then, after providing this data, the role of the media is reviewed/ What sort of service did the media perform? How effective was it in doing this?

Finally, there is a discussion of the overall findings of this report, a discussion pointing the way to overcoming some of the limitations and a discussion aimed at showing the way to future research.

Power

Since the initial problems were caused by the wind rather than flooding, the power company was one of the first to be affected.

The difficulties began on Monday with some problems in Lakelse Lake (later flooded) and a major break in one part of Terrace. Power in Lakelse Lake was out for four hours. Part of Terrace was out for two.

On Tuesday there were more problems. One main distribution system went, knocking power out in Prince Rupert for 10 minutes until a switch could be made, and leaving Terrace and Kitimat without power for 44 minutes.

There were other problems in the area that evening, most of them caused by trees falling across power lines.

The power company, aware it was facing increasing difficulties, had started to bring in assistance from Kitimat to Terrace, then, faced with increasing problems in Kitimat, from Prince Rupert to Kitimat.

Power repair work is skilled labor and can be dangerous: the company cannot replace skilled personnel with untrained outsiders even if there is unemployed labor available.

It was Wednesday, however, that the situation began to assume crisis proportions.

Not only were there a series of problems but many were in areas that were becoming increasingly inaccessible as flooding grew worse and roads became impassible.

During the day on Wednesday, the power company broadcast messages to its customers telling them service would be restored as fast as possible.

As later detailed reports on each community will show, most of the communities

studied by ECRU were hit by one power problem or another on Wednesday:
. Lakelse Lake was hit by problem after problem, finally left without power. Crews trying to make repairs discovered the wind, rain and flood conditions made repair work dangerous. Finally, attempts to restore power in Lakelse Lake had to be halted.

. Old and New Remo, though both close to Terrace, were hit by floods that made access increasingly a problem. Service to the communities did not go out. Service to individual homes did. One particular area found itself caught when access was cut off because a bridge was washed away and another one flooded.

. Cedarvale, east of Terrace on Highway 16, lost power for the second time that week and was to remain without power for a week. Access to the Cedarvale area -- it's serviced from Hazelton to the west rather than from Terrace -- was impossible. The community itself was cut in two by washouts on the main highway.

. Greenville, a native village to the north also lost power on Wednesday, a loss not discovered for another day. With the phone service to Greenville also out and the roads impassible news of the break could not be sent to the hydro office in Terrace.

The one community not hit by a power problem was the hamlet of Rosswood, strung along a logging road north of Terrace. A few people in Rosswood have private generators. Most have no power. A power break has no effect on Rosswood.

As the storm subsided on Thursday, the power compnay found itself with crews generally available and lots of work for them to do. But access remained a major problem.

For several days, the power crews did what they could to restore power in communities where they could gain access. That meant that places such as Lakelse and Cedarvale had to wait.

There was one other problem in many of the flooded areas -- places such as Lakelse Lake, New and Old Remo.

Before power could be restored to individual homes, a check had to be made to be sure no problems had occurred because of the flooding. Power could not be restored until this was done. Otherwise there would be a danger from fire. Most people had, in fact, turned off their power when the flooding began.

By the second week in November -- eight days after the day -- service in the affected area was basically back to normal. There were still a few problems -- some poles were still askew -- but from the customers' point of view power was as usual.

The operation cost the power company thousands of dollars in equipment and overtime. All of its crews worked to the limit and beyond.

Almost more than any other company, power worked, a great deal of the time, in co-operation with other agencies.

It worked with the telephone company because power and telephone lines often share the same poles. (This was true in Lakelse Lake.)

It worked with the R.C.M.P. because the police -- out on patrol -- were often the first to report downed lines.

And it worked with highways because the major problem in the clean-up was the problem of access. Crews could be moved in to do repairs only when highways informed them places had become accessible.

As part of this co-operation, the power company allowed the telephone company to borrow some equipment trucks. The telephone company in turn gave the power company access to a telephone helicopter.

Telephone

In some ways, the telephone company's problems as a result of the storm matched those of the power company.

The wind that knocked trees down across power lines in the Lakelse Lake area, for example, knocked out the phone lines as well. The two sets of lines are strung together.

Power and telephone crews worked side by side in an attempt to repair the damage, a process that, at times, became futile.

The worsening weather and the growing flooding meant that repairs made one day would be useless by the following day. It seemed, at times, as if the same job was simply being done over every day.

The flooding in the area also made some of the work dangerous. The fast flowing water -- sometimes shifting its course -- made the footing unstable.

> ...the force of the water...pushing at you. That's the thing that got us. You were always afraid you were going to be swept away.

The crews decided that it was unwise to go much above their ankles in water. Otherwise the water would have been much too powerful.

To the north east, where the phone company shares its facilities with the railway, there were similar problems.

Because the rail line was overrun with water, hit by slides, washed out, the phone service was out several times.

Service to Kitwanga and to Cedarvale -- Cedarvale is reached via Kitwanga -- was out at one point for 60 hours and 25 minutes then out again twice more as the railway tried to make repairs.

There were also problems in Terrace itself.

Wednesday afternoon, as the flooding began to peak, water seeped into one of

the older cables in the downtown area knocking out telex services -- including those to the railway -- and cutting off the main news service wire to the daily newspaper.

That service was out from 3:30 p.m. Wednesday until 4 a.m. Thursday and it led to a series of anxious calls from the newspaper to the company.

Finally, the company discovered that a cable car it uses for access to a facility up the Copper river had been carried away by the storm. In order to provide regular maintenance the company had to hire helicopters for its crew.

But the telephone company had another problem.

In time of crisis, people turn to the telephone and use it well beyond the norm. Those who are trapped inside or outside the crisis area call relatives and friends. Those who need emergency supplies or staff call for this help. Those concerned call for reassurance. The media call.

As a direct result of the floods, operator assisted telephone calls in the Terrace exchange jumped 50 per cent above normal. The local staff had to be supported by six additional operators brought in from Prince George.

In addition, as soon as conditions became serious, the outside telephone system adjusted its service to the Terrace area. Operators asked to call Terrace were told to make one try then inform their customers that the circuits were busy and they should try later.

Such a move is usually automatic when the local chief operator thinks it will reduce the strain on equipment in the crisis area.

Despite the problems and the increased demand the basic telephone service to

the city of Terrace remained pretty well intact throughout the flood period. But that didn't entirely relieve the company's public relations personnel from enquiries.

Just as the storm hit its peak, news reports from Vancouver -- datelined Terrace -- stated that the floods "severed most highways and telephone links... ."

The story was simply not accurate. (It had actually been phoned to Vancouver from Terrace on a functioning telephone.) But it led to calls from within the company asking when the service would be restored.

Natural Gas

As the problems of flooding, etc., built up during the day on Wednesday, officials of the company that owns the natural gas pipeline serving Terrace and area realized their turn might come.

On Wednesday afternoon, they warned the staff watching the pipeline pressure guages to keep a close eye on them: a break was possible. At 9:30 p.m. Wednesday, the break came.

The company officials in Terrace reacted almost immediately.

First, they started making arrangements for helicopter flights to go out the following morning to try and locate precisely where the pipeline had broken.

Second, they started notifying customers that they would have to cut back on their use of natural gas. That decision was made public -- and broadcast -- the following day.

The next morning the break was located fairly quickly. The line had been torn apart in the Copper river area, an area close to Terrace, but an area heavily covered with trees, hilly and not easily accessible except by helicopter.

The company, at first, decided to fly repair crews in, haul in supplies, keeping the crews there in tents, working as long as possible.

Eventually that plan was scrapped.

Each day, as soon as flying conditions permitted, the first helicopter flights brought in the work crews. Then, using long lines hanging below their planes, the helicopter pilots slund in the necessary supplies, equipment and pipeline.

As work progressed, the helicopters aided the work crews by moving equipment from spot to spot, often dropping a line through the trees to haul a welder from one section of pipe to another.

Many of these flights were made under extremely marginal conditions.

One helicopter lost part of its load off the sling when the load started to sway back and forth. Another was forced to ease its way along power lines then cross the lines at a tower before continuing its route along the river. A third which had gone up through a break in the clouds was forced to retrace its path to get back down under the clouds again. (Helicopters fly by sight and must retain a reference to the ground to maintain their stability.)

What the company actually did -- given the conditions -- was not so much repair the break as create a new section of line along a razorback ridge linking up the unbroken sections of the line.

The process was actually completed in about six days.

But the troubles were far from over.

As the company attempted to restore partial pressure -- the replacement section of the line was a hasty job -- it discovered pressure would not come back on. There was a further break on the line.

As it turned out, discovering the new break proved easy. A helicopter, flying above the Copper river, saw a geyser rise as soon as the attempt was made to restore pressure. The pilot had been almost directly above the second, underwater break.

By now, pressure in the gas system in Terrace and area was dropping dangerously

low. It appeared for a time the system would simply stop providing gas -- a situation that might have forced many families to leave their unheated homes and head for hostels, heated schools and church basements.

(Provincial Emergency Program personnel were already scouting for suitable locations and lining up needed supplies such as cots and blankets.)

The company decided that the fastest and most effective response would again be a temporary by-pass, a by-pass made of pipeline well below the normal diameter. It set out to repair the second break as fast as possible.

As things turned out, the final repairs were made about as late as would have been possible. The final day -- when the pressure was partially restored -- the company had been forced to ask homeowners to turn their thermostats off (a request apparently complied with by almost everyone).

Once service in the line was restored, the company then set about replacing the new by-pass with two additional new sections of pipeline, eventually opening up a road and putting in a new section with the old diameter and capacity.

The Railway

While the power and telephone company had to face a series of problems and the gas company had to cut back on service, the rail line had problems far worse. Its main line -- the connection between the region and the rest of Canada -- was knocked out for approximately a month.

At the best of times, maintaining a rail line in the wet, mountainous country around Terrace is not an easy task.

The entire line must be checked daily and suspected areas more often. Section crews are constantly trying to take care of soft spots, loose bolts and potholes.

Not only that, the erratic weather often leads to freezing beneath the tracks which requires careful adjustment (known as shimming) or the weight of engine units on the many curves pulls the track out of line.

In addition to the problems of normal maintenance, section crews in the Terrace area must fact the possibility of high water -- water well above normal levels -- and snowslides. Both are common to the area.

The track in the Terrace area is divided into three subdivisions or "subs" as they are called on the railroad. There's the Bulkley sub -- Smithers to Terrace, the Kitimat sub -- Terrace to Kitimat, and the Skeena sub -- Terrace to Prince Rupert.

During the days leading up to the flood none of the subdivisions reported other than usual maintenance but starting on Tuesday, October 31st, the problem reports began.

The Skeena sub -- Terrace to Prince Rupert -- reported first: high water over the rails. That was clear by 10:30 a.m. Tuesday.

Just after noon the same day there were more problems in the same general area -- a washout to be attended to. That, too, was taken care of. Traffic was flowing again by mid-afternoon.

But, further east, along the Bulkley sub, there were problems as well.

A crew reported at 9:40 a.m. that a creek had blocked and that water was running over the tracks.

Later that day -- just 35 minutes after a section crew had made a patrol -- a slide covered part of the track and a passenger train was derailed.

> It was a big bump.... I just thought maybe we hit a moose. When the train hits a moose, exactly the same thing...

The railway was forced to take the passengers back to Kitwanga -- just east of Cedarvale -- and carry them by bus. The Bulkley sub was closed for 12 hours.

The incident was not reported to any outside agency. No one was hurt.

Normally, the railway notifies others only if the, too, are affected or if there is some legal responsibility. Thus it often deals with highways along the Skeena sub because in several places there the highway runs along the railway right of way. And it notifies the R.C.M.P. promptly if injuries or a fatality is involved.

On November 1st, these relatively minor problems were replaced by a series of major ones. Before the day ended there were serious problems -- washouts, slides -- in all three subdivisions.

At 9:30 that morning, there was water backing up in the Skeena sub, between Terrace and Prince Rupert, the same general area where New Remo was to be hit by flooding later in the day.

Before 10 a.m. the water had backed up onto the track and a bridge had become clocked.

(The rising waters of the Skeena were making it more difficult for water to run easily through culverts into the river.)

At 11:05 a.m., trees blocked the track along the Kitimat sub. The problem was spotted by the R.C.M.P. who called the railroad.

Then, at mid-day, an ominous sign: one of the creeks had gone dry. The section crew foreman, assuming that the creek was blocked up the mountain, immediately pulled out his crew and equipment.

(Usually a dry creek in the pouring rain means a blockage which eventually will clear when the water pressure has built up to the point it can either tear its way through or find an alternative route.)

By late that day, CNR logs showed problems in all three subdivisions -- high water, slides, a bridge blocked, trees on the track. In the Bulkley sub -- between Smithers and Terrace -- there were nine reports, three of them involving actual washouts.

A major washout means that the road bed has been washed away but, usually, that the track still spiked to the ties is suspended over the water flowing below. (Photos taken the following day show that long sections of track were, in fact, hanging suspended over fast-flowing streams.)

By the end of the day, the only traffic moving anywhere in the system was the railway's own crews -- speeders and work trains carrying men who were trying to make what repairs they could.

Late Wednesday, one crew came in after walking to Terrace from a slide along

the Kitimat sub, south of Terrace. When they reported in it was decided a crew should take a work train -- two locomotives, a ballast car and a caboose -- out to where another crew were still at a washout on the Bulkley sub.

The unit sent out ran into a major break in the line. Two parts of the train went into the river. Two men went in with them.

When the two men were rescued the crew members discovered that a vital piece of equipment -- a reversing bar -- was still in the engine unit that had gone off the track. While two men -- including one who had been badly shaken -- waited in the parts of the train still on the tracks, the other two went to try and recover the missing equipment.

By this time (it was now early Thursday morning) the road bed was in weakening condition. The idling of the heavy engine apparently led the shaken road bed to cave in under the remaining two parts of the train -- an engine unit and a caboose. The two men -- one of them for the second time -- were plunged into the river. There, they died.

The incident was the only fatality directly tied to the floods that took place in the Terrace area. (Earlier a child had died during the high winds but that death took place to the east, away from Terrace and the communities surrounding it.)

In the days and weeks that followed, the railway set to work trying to restore the damaged line. It used its own work crews and outside truckers and heavy equipment operators to create and haul ballast to fill in the washed out sections. At times, the crews came close to records in dumping car after car to fill in the areas where the roadbed had washed away.

By December 3rd, just more than a month after the major floods, traffic began to flow along the Bulkley subdivision, the worst hit part of the line.

But the line wouldn't be fully restored for months.

Many sections of the line had to be marked with green flags warning engineers to hold their speed to a bare crawl, 10 miles per hour. All through the winter, work trains continued to haul rock to gradually extend the narrow road bed so as to provide an adequate support for new track to come.

Even while this work went on, section crews had to continue their daily patrols looking for problems in other parts of the sub, wondering whether spring would reveal some new trouble spots hidden by the snows and freezing of winter.

Highways

Though all the other agencies had problems, highways became the focus of attention. For it is the highways, above all, that provide the access that allows most of the others to carry out their normal and emergency functions.

The provincial highways department at Terrace maintains regular patrols throughout the year. But, from April until the end of October, the patrols are largely a matter of office routine. They operate eight hours a day, five days a week, closed at nights and on weekends.

Starting each year on November 1st, highways changes its operational style. Patrols are in operation 24 hours a day, seven days a week, as winter is the problem season in the Terrace area. Rock falls, snow slides and other problems regularly interfere with highway traffic.

In one sense, therefore, the troubles that hit Terrace as a result of the weather were almost expected. The highways department expects trouble at the beginning of November. It got it just a matter of 24 hours ahead of schedule.

The first highway problem was recorded at 8:15 a.m. on Tuesday, October 31st, when a slide partially blocked the main Trans-Canada highway, #16, 25 miles east of Terrace. Traffic was reduced to a single lane.

As soon as the report was received, the incident was recorded on a routine trouble sheet then, about 25 minutes later, passed along to the local radio station, CFTK, Terrace.

Highway problems are called to public attention automatically almost as soon as they occur.

As it turned out, that trouble report was the first of 120 incidents to be

recorded over the next few days. By the time another 24 hours had passed the incident calls were coming in so quickly the paper work simply piled up. The staff could not keep up with all the difficulties being reported.

On Tuesday, however, there were just two more problem entries.

At 1:15 p.m., Lakelse Lake Lodge Road was blocked.

At 3:30 p.m., the Kitimat Village road went and a bridge was washed out.

Both items were recorded and both pieces of information were passed along to CFTK.

The following morning, Wednesday, November 1st, the day the winter season officially begins, highways ran into the most severe problems it has ever encountered in the Terrace area.

Officials described what happened as a "200 year" disaster meaning it's unlikely problems of the same magnitude will occur for 200 years.

At 10 a.m., Highway 16, 21 miles to the east, was blocked by a slide. That cut off the road link between Terrace and Prince George, isolating Terrace by road from the east.

Highways officials considered the matter serious.

As usual, they notified CFTK. But they also called the R.C.M.P., the bus company and CP Air. And they told the crew who operate the weight scales, checking commercial traffic, that there was trouble along the road.

A couple of hours later, there was water reported on Highway 25 to the south, linking Terrace to Kitimat. That road too had to be closed.

CFTK and the R.C.M.P. were promptly notified.

Then, after a few hours of relative quiet, the roof quite literally fell in. One after another, a series of major bridges were washed away, sometimes literally carried away by the flood waters pouring down from the mountains.

In a matter of a few hours, 25 bridges were lost or damaged beyond repair.

For the highways department, it was a catastrophe.

As it happened, the highways minister and a number of officials had been attending a conference at Terrace and the news, which became increasingly sombre, quickly spread through the meeting.

The minister, who had other duties, decided at first that he would try to leave. He asked an aide to line up a helicopter. No luck. Flying conditions were impossible. He tried to get out by road heading west to Prince Rupert, a road reported to be still open.

A few hours later, he was back, stuck in Terrace.

By the time the minister returned it was clear that highways had to cope with the worst problems seen in British Columbia for many years.

Not only were roads washed out and bridges gone, travellers were stuck between the various breaks in the highway. And as the evening moved on, there were reports of some persons being injured when they came suddenly onto bridges that were no longer there.

(One highway crew saw a truck head into a broken bridge. They rescued the two men involved and managed to comfort them. Road conditions made moving them by road impossible. Since the flying conditions were also

impossible, the highway crew had to look after the two men -- one of them with a broken neck -- until morning.)

Once he realized he was stuck in Terrace, and became aware of how serious the problems had become, the highways minister decided it was time for him to act.

As it turned out, under B.C. law, he has the overall responsibility for disaster response in flood conditions. The official emergency agency, PEP, the Provincial Emergency Program, is responsible to him in such conditions.

Settling down for a long night, the minister promptly got on the phone to order a hasty response.

Within a matter of hours, highways officials in Victoria and at the provincial office in Hope had put together relief crews and relief supplies.

Crews from Cloverdale, Langford and Courtenay got hold of pipe, culvert material and Bailey bridges. The regular ferry to Prince Rupert was commandeered and loaded with supplies for the restoration of the roads. A special camp was rented, fitted, re-roofed, equipped and put in shape at Kitwanga.

And not only was the response fast, it was generally efficient.

For example, as the ferry, Queen of Prince Rupert, headed north loaded with equipment a radio technician adjusted the radios on the equipment to the frequencies used in the Terrace area. That meant the new crews could operate more easily after arrival with the local persons in charge.

While equipment was being secured outside the crisis area local highways staff

tried to round up supplies and equipment in and around Terrace.

To some extent that was not difficult because local owners had found themselves out of work due to the shutdown of logging operations. They were pleased to take on contracts for highways.

But there was some demand from the railway as well and the highways department and the railway found themselves competing for the same limited supply of equipment.

When morning came and flying conditions were at least minimal, highways swung into action.

Helicopters, hired by highways, began the job of rescuing highways crews, picking up stranded motorists and, first, looking after the needs of those who were injured or had medical problems.

They also flew in supplies to a hastily rented and renovated work camp in Kitwanga so that crews could work as many hours as possible.

It soon became clear that in running an efficient operation the co-ordination of the helicopters was a major concern so, starting sometime on Thursday, highways created its own director of flight operations.

Helicopter pilots were assigned from the highways operations centre -- many of them simply landed in a field beside the highways office in Terrace -- and were asked to keep in touch lest assignments be changed.

The operations personnel were able to try to co-ordinate trips involving supplies and equipment with trips involving movement of stranded persons, movement of food or medical supplies.

Finally, highways, as is its custom, made sure that media from the Terrace area, and from outside, were given every opportunity to see what was going on. Almost all the pilots -- at one point eight helicopters were flying for highways -- had reporters with them at one time or another.

The Helicopters

Though road and rail traffic were out in the days immediately following the flood, the air was open - at least to the versatile helicopter. For a couple of weeks. Terrace and vicinity were unquestionably helicopter country.

All in all, at least six owners provided at least 16 helicopters for service in the wake of the flood. At the peak, 12 to 14 planes were flying at one time in the general vicinity of Terrace.

Though the planes ranged in size from a tiny one man aircraft - around for just one day - to a larger 14 - seater, the bulk of the helicopters were the standard "205" model capable of carrying four passengers or a 1,000 pound load. With a single engine and a full tank of 65 gallons of gas, they could stay in the air for about two and one-half hours at a maximum speed of 120 miles an hour.

But the reason for the influx of helicopters was not range or speed or carrying capacity. There were there because they could fly when nothing else could get off the ground and because they could go regularly where nothing else could gain access.

Canadian air regulations make a specific exemption from normal air restrictions for helicopters travelling outside controlled air space. In effect, they allow the pilot a great deal of discretion providing he "can command adequate opportunity to see other traffic or obstructions in time to avoid a collision."

A few of the aircraft took advantage of whatever business came along. One, for example, put together groups of stranded motorists and flew them to Smithers from Terrace at roughly $40 a head.

But most had specific contracts.

They flew men and equipment into the Copper River area where the gas company was trying to patch together a temporary repair

on its broken pipe. The new line was being worked over a razor-back ridge. The job involved slinging in pipe, often far below the aircraft (it had to be dropped into a forested area), moving welding equipment and taking men in and out. Quite often the equipment was hoisted by helicopter and moved 100 feet or so, so the work could continue.

They carted fuel to railway work crews usually hooking two 75 gallon fuel drums below the aircraft. The hook can be released by lowering the drums to the ground making it possible for delivery without assistance.

They flew telephone crews to remote areas to check out the area's telephone installations, and did the same for hydro operations.

And they did a great deal of work for highways, the provincial agency with the overall legal responsibility for taking care of the post flood problems.

The highway operation illustrates the extent of the involvement of the helicopter.

Working from an office in downtown Terrace, a flight controller -- a real estate man drafted into the job -- put together daily schedules for the craft at his disposal. Then, each day at about 7 a.m., he would hand out the starting assignments. From then on, operations carried on in line with priorities that occurred as the day went on.

At times, as the aircraft returned from assignments and landed in a park across from the highways office, the controller would go to his window with a loud hailer borrowed from the police and boom out the next assignment.

The loud hailer was also occasionally useful for chasing curious children away from the machines.

The system didn't always work. One night, two days after operations began, children tore antennae off two helicopters. The company had to fly for two days without regular communications and fly in replacements at a cost of about $1,500.

Since highways looked after the needs of the Provincial Emergency Program, many of the highways flights were related to emergency needs.

On Thursday, the day operations began, for example, the highways-operated helicopters brought in all the stranded motorists and about 50 loggers stranded at two different camps.

Later, they flew in medical supplies to isolated communities, flew out people needing medical care, flew in food, even cigarettes, to those who had called for help, and carried individuals separated from their families.

One major operation- this time for highways itself - involved the setting up of a camp at Kitwanga. The camp was rented but before it could operate highways flew in roofing repairs, food supplies, clothing, blankets, even two cooks who had come in from Vancouver Island. The camp served about 75 men until it was closed down a week later.

Given the bad weather - low ceilings and low visibility - and the crowded air space, the pilots, after a day or two of confusion, decided they had better organize some of their own air safety procedures. They got together and agreed that once they had left the controlled area around the airport they would all turn their UHF radios to 122.9. Then they would call out their location and direction and speed.

Within the controlled area - five miles around the airport - all planes came under the direction of air radio and contacted the airport on 126.7.

In addition, the aircraft maintained their own separate company communications on HF (high grequency) radios that allowed them to talk to other aircraft from the same company or to their base.

This did not always make communications easy. The highways flight controller, quite often, had to phone a company at Prince George, a couple of hundred miles away, and get the company to contact the aircraft. Or sometimes he waited for a pilot to land at Kitwanga, near where the highway camp was located, and phone in on the one available pay phone.

In addition to these working flights, the planes flew a great many flights for media - particularly CBC and CTV - and for various inspections. Nearly every company facing problems in the wake of the flood had various officials who wanted to see what was going on. The pilots found themselves, at times, flying what amounted to VIP sightseers.

One man who didn't fall into this category - though he was a VIP - was the minister of highways. Charged with the legal reponsibility for flood response and stuck in the area himself, the minister became personally involved in the highways reaction and was soon on first name terms with all those running it.

His personal presence undoubtedly speeded up the immediate response from provincial officials in Victoria.

The entire process was not without problems.

Sometimes pilots, flying in extremely low ceiling conditions, had to creep along a river valley watching anxiously for a power line. Then they would turn along the line to the power tower crossing above it because, as a fixed structure, it was easier to relate too.

Helicopters fly under VFR-visual flight regulations. That means they have to see where they are going. And that's not just a rule.

A helicopter caught in clouds quickly loses its stability because the pilot has no reference point. It can very rapidly mean destruction to the vehicle and death to its pilot.

One pilot, slipping through a hole in the clouds, found he could not get back down again. He had to retrace his flight path to where he had started and then make the same journey under a very low cloud cover.

Although the pilots are used to the Northwest and bad weather, they were not all familiar with Terrace or with the equipment they were moving.

One pilot, coming in for a VIP pickup, landed at the wrong spot. He simply could not pick out one field from another.

On another occasion, the controller, wondering how to describe a "launching pin" for a Bailey bridge, told the supplier to splash it over with yellow paint. Then he told the pilot where the item was located and told him to pick up the one painted yellow. (Yellow was chosen because that was the only paint color available.)

While overall the work of the pilots - particularly their flights to areas cut off by road - shortened the clean-up period immensely, there were a fair number of doubtful emergency runs.

On one occasion, for example, a plane,diverted to pick up a pregnant woman. She was fine and her pregnancy was still in its early stages.

There were, as a result, a fair number of diagreements between highways and those requesting emergency service. On the whole, for example, the controller refused to move passengers simply because they wanted home. That was not treated as a priority.

Sometimes, however, human life did seem at stake and special flights were ordered. One northern flight required a plane to come in from clearer weather and eventually take a woman who was hemhorraging into the hospital at Dawson Creek.

The total cost of the operation was spread around a number of companies and agencies. But it was definitely substantial. The 205's run about $330 an hour and many were in the air five and one-half to six hours a day.

In addition, the presence of the planes meant an injection into the Terrace economy. The pilots and their back-up personel - there were often nightly maintenance needs - stayed in Terrace hotels and spent their money in town. One company, which landed a longer-term contract, actually moved a man into Terrace for continuing operations.

Terrace

In a sense, Terrace, itself, was not hit directly by the disaster.

During the build-up period, Terrace's local PEP co-ordinator had kept a careful watch on the water level of the Skeena river. He and his staff watched as the level rose 12 feet in 40 hours.

But, between 3 a.m. and 6 a.m. Thursday, the staff were able to breathe a sigh of relief. The river level - which had been rising steadily - stopped rising and started to subside.

And the direct flood threat to Terrace had passed.

Terrace had suffered some temporary power outages and flooding in a few basements. On the whole, however, the community was unscathed.

In another sense, however, Terrace was, in many ways, just as isolated from its neighbors and the rest of British Columbia as the smaller communities were isolated from Terrace.

The roads were cut in all directions - even the minor logging roads to the north were impassable. The rail line was out. The natural gas supply had been cut.

Even the Terrace airport which remained open offered little relief. Flying to Terrace at the best of times is an "iffy" proposition.

Because of these problems, Terrace was unable to provide the normal flow of services to the surrounding area.

The broken highway meant that individuals could not drive to and from work, could not be taken to and from school, could not come in to shop, to do business, to get medical attention.

The broken highway and rail line meant that the normal flow of supplies was stopped. Terrace's stores found themselves cut off from the normal flow of produce and supplies.

The broken natural gas pipeline also affected many operations in Terrace. Some schools had to be closed. Some businesses had to close or cut back in operations. Residents had to dress more warmly as they turned down their thermostates.

And the general transporation breakdown meant that some people were stranded in Terrace who had not planned to be there. Everyone from the highways minister to the ordinary hitchhiker found him or herself making an unexpected stop in Terrace.

(Most of those stuck along the broken highway were picked up by helicopter and brought into Terrace.)

Prince Rupert and Kitimat were both affected as well since both lost their link to the east by rail and their gas supply. But both cities have a link to the outside by sea. Terrace was cut off except by the erratic link by air.

ECRU did not make a detailed examination of the situation in Terrace, itself. It did examine the situation with relation to the school system, to the hospital and it did take a look at the overall effects on the economy.

The next section of the report deals with the impact of the floods in these three areas.

Schools

The schools in Terrace, which service children from the surrounding area, were hit by two things: the closing of the roads and the break in the natural gas pipeline.

The break in the roads meant that school buses had to stop running. In some cases - such as Rosswood - it meant that the children were forced to remain at home while the closure continued. In other cases, as with children from Cedarvale, it meant that children from outlying communities were forced to find billets in the city because they were not able to return home.

The decision to close or not close - and the decision to send or not send children home early - appears to have remained largely with the school authorities. In Terrace itself the Superintendent of schools does not allow individual drivers or individual principals to make such a decision.

Despite this, on Tuesday the bus taking the children to Rosswood did leave early and after a somewhat roundabout trip it did get the Rosswood children home. Children and bus were to stay there until the roads opened again the following week.

But, elsewhere, the principals stuck with the school policy. At Kitwanga, where some children from Cedarvale go to school, the principal declined to let children go early despite calls from anxious parents.

(He did check with the highways department who assured him there was no danger.)

When the children did leave, they went home on a bus that was travelling over weakened roads. Although accounts vary, it seems clear that at least one section of the highway collapsed roughly an hour after the bus full of children had passed by.

Eventually it became clear that some children, especially those who are bussed into Terrace, would not be able to get home. The children were notified by public address to come to the principals' offices and told to find a place to stay with friends.

All of the children involved - there weren't that many - apparently had little difficulty finding a friend to put them up.

But there were a few problems.

Despite announcements on the radio, all parents did not hear precisely what had happened to their own children.

All this had happened on Wednesday.

On Thursday, there were more problems: the schools were notified that a natural gas shortage would force closure of some schools: 10 of the 17 are heated, at least in part, by natural gas.

Just as the children were heading home on Thursday they were told the schools would be closed or at least open only for assignments to be handed out on Tuesday and Thursday morning.

The system of occasional visits for assignments - which carried on for about a week - apparently worked quite well. Most principals reported attendance was average or better. In some cases, families from the smaller communities had moved into Terrace making it easier for the children to get to school.

As the days wore on, some children from the outlying communities were able to get home. Sometimes, the buses drove them to a washout where they were met by their families. In three cases, the children were eventually flown home by helicopter.

As a result of the temporary closures, most of the schools cut back on some other activities once school resumed.

When the schools were open, some of them had an additional problem. The drinking water had changed color as a result of the flooding and some principals were unsure it was safe. Most of them instructed the children not to drink the water.

Strangely enough, however, the school that was hardest hit in terms of attendance did not reach that position because of the flood. It just happened that that week included a run of strep throat and chicken pox.

Hospital

As things turned out, the hospital was largely unaffected by the disaster.

Aside from the fatalities, there was only one serious injury caused by the disaster and only one or two patients brought in from the outlying areas.

Since the hospital, by chance, had cancelled elective surgery on Wednesday and Thursday (for boiler maintenance), it was well below its normal capacity, easily able to handle any immediate problems. Occupancy fell as low as 53 on Sunday, well below the 75 to 85 patients normally in residence.

Although the hospital was never officially notified there was a disaster - since one was never declared - the hospital director, after discussing the matter with a helicopter pilot and listening to the radio decided it would be wise to take precautions.

The hospital boilers were switched from gas to oil - they have the capacity to take either - and extra supplies were ordered.

The dietician stepped up the order for bread and milk and, assuming the meat order would not come in (it didn't), ordered pre-cooked meat to take care of the meat requirements.

When the water became muddied, the staff first boiled the water, then switched to an outside supply. One of the staff had a clear well and used it to fill up half a dozen five gallon tins. This water was given to patients as drinking water.

(Later the same woman advertised the availablity of clean water to others who might want it.)

Worried about the water, the hospital also complained to the local health unit which arranged to test the water both locally and in Prince Rupert.

When the report came in from Prince Rupert, it advised that the water was unfit to drink before boiling. The health unit provided this information to the local radio station which broadcast it. It did not, however, pass it on directly to the hospital.

This communication gap illustrates the hospital's main complaint after the incident: that it was not informed whether or not there was a disaster and whether or not it should move to its disaster plan. Its information generally came from the media or from those who happened to drop by.

This hospital was involved in one other emergency arrangement. Concerned lest supplies not come in by truck - they didn't - the pharmacist made arrangements to have his regular needs flown in.

The Economy

While the schools coped as best they could and the hospital carried on somewhat uncertain about what was happening, the local economy, in many cases, was severely disrupted by what happened.

In addition to its effects on Terrace and on the surrounding communities, the floods had an enormous impact on the economy of Terrace, of Kitimat and Prince Rupert and of the surrounding area.

In some cases, the floods meant a loss of employment or business.

In other cases, the floods meant personal or business income well above normal.

For loggers, for example, the floods meant layoffs and no compensation. As the problems with logging roads and powers lines began on Tuesday, for example, one by one the logging companies shut down their operations.

Most of the loggers headed home.

For workers in the affected agencies - telephone, power, gas, highways - the floods had an entirely different effect. They worked incredibly long hours, sometimes at extremely high rates of overtimes.

Some workers banked cheques three, four and five times the normal rate as a result of the crisis.

The same kind of varying effects were true right across the spectrum.

The break in the rail line, for example, meant that the running crews were laid off. Some of them, because of seniority, could move elsewhere. A few got work on the work trains involved in repairs. Most were simply off work.

But, at the same time, the railway was hiring outsider contractors who had heavy equipment to provide rock for a new track bed. Many of these contractors expect a slowdown at this time of year. Instead, they found as much work as they could handle.

Transportation felt the same varying impact.

The bus companies - with no roads to run on - had to stop their regular service along the highway. The bus drivers were laid off.

The helicopter companies - more in demand then ever before- brought in extra planes and crews, even relocated some service staff in Terrace.

The Terrace flods were a bonanza for the helicopter firms. Business was never so good.

ECRU did not attempt to document all of the economic effects of the floods. Nor was any attempt made to put an exact price tag on those that were documented.

But the list is impressive.

A check with some of the logging companies in the Terrace area showed the following:

. 15 to 20 men off for eight days;
. 25 to 30 men off for a month;
. 25 men off for two weeks;
. 25 men off for 15 days;
. 15 men off for one week;
. 75 men off for two weeks;

. five men off for 10 days;
. five men off for 10 days;
. 100 men off for two days.

Given standard rates of pay, in the neighborhood of $8 per hour, the men, all from the Terrace area, would have lost about a quarter of a million dollars in wages.

Sometimes firms were able to continue operations at least in part. Some lumbering firms were, for example, able to continue shipping lumber. But there were two problems.

First, because of the shortage of natural gas, they had to refrain from drying it and ship it green. Second, because of the rail break to the east, they had to ship the lumber by sea from Prince Rupert instead of by rail via Prince George.

Rough calculations suggest that given the lower price for green rather than dried lumber and the higher costs for the alternative shipping route, the companies were down about half a million dollars. In addition, employees at the kiln (where the lumber is dried) were laid off.

The decision by these firms to ship via Prince Rupert meant, of course, that there was additional work for the harbor.

The cutoff of road and rail traffic brought other benefits to the harbour as well.

Some barge companies put on extra service as a result of the road breaks, bringing in, for example, refrigerated vans by sea. The vans, carrying produce, usually travel by road via Prince George. One firm had a fross increase in business of about a quarter of a million dollars during the time the roads were out.

But the harbour also suffered.

Grain shipments from Prince Rupert gradually came to a halt.

The booming grain export business was out for a month and ship owners, with ships already en route, to the port and to divert them. The costs to the ship owners are incalculable. First they had to pay the extra cost of diversion - $7,000 a day - to Vancouver then the costs of waiting in line in Vancouver.

The delays would require a complete re-working, in many cases, of shipping schedules, perhaps affecting company operations for months to come.

The break in the rail line affected shipments of chemicals to some firms forcing them to cut back on their operations. One firm estimates its productivity - expressed as a percentage of normal operations - dropped to 50 per cent as a result.

The break in the gas line had its own effects.

Some firms - including bakeries - had to slow down their operations. Others, especially one in Prince Rupert, had to cut back entirely.

The major industries in Kitimat had to adjust or cut back on operations. One of the major production operations in Kitimat went from two to one shift per day, a loss in production for the plant, a loss in wages for the workers affected.

Finally, some firms found their supplies stuck at various points along the highway. One wholesale firm had six drivers trapped with their vehicles - three close to Terrace, two just beyond Cedarvale, two further out. The firm picked up the drivers by helicopters but the tractor trailers remained stranded until the roads opened.

One firm found itself stuck with 20,000 loaves of bread about to reach the expiry date. It called a number of institutions and the word quickly spread (apparently by CB radio.) The bread went.

Finally there were a few odd effects.

The liquor stores had a slight increase in business while the roads were closed. Presumably this was because a number of people were trapped in Terrace with nothing to do.

The hardware stores had a small increase in business especially in items such as coal, oil and kerosene lamps and candles.

And one furniture store - by offering delayed payments - made a lot of friends among those who had to replace furniture damaged by the flood. The store agreed to accept payment when government compensation arrived.

(ECRU did not attempt to document compensation procedures as part of this study. It should be noted however that individuals directly affected by the flooding in their homes were given compensation.)

The Smaller Communities

The preceding material gives the impact of the floods on the various operations that service the Terrace area. The impact can also be seen from the point of view of the individual.

Terrace, as mentioned earlier, is surrounded by small communities such as Lakelse Lake, New and Old Remo, Cedarvale, Rosswood and Greenville.

Some of these communities -- Lakelse Lake, New and Old Remo, for example -- were severely flooded.

Others -- Greenville, Rosswood and Cedarvale -- weren't hit so hard by flooding but they were isolated.

This section of the report examines, in some detail, what happened in these individual communities. The accounts are based on interviews drawn by sample from one resident in every second household, on information obtained from the various official agencies where they had contact with these communities, and on some follow-up interviews with specific individuals in the communities where this appeared appropriate.

On the whole, with one notable exception, there was little problem in obtaining these interviews. All but one of the persons in the sample were willing to provide the information asked for on the understanding, as usual, that names would not be used.

Despite this general co-operation, the process was not as simple as it might sound or as easy as most ECRU field research projects.

Many of the communities described are genuinely difficult to reach, even in normal times. All of them are generally unmapped, often without street names;

so that locating houses to establish the basis for a sample is not easy.

Rosswood, for example, consists of various styles of homes scattered along, sometimes near, sometimes not so near, a logging road. Access to Rosswood is possible only by driving along that road, a road sometimes blocked, sometimes hit by rock slides, sometimes obscured by fog. (Reaching some of the homes required four-wheel drive.)

Cedarvale, a community split in two parts, is partly along the main highway, partly across the Skeena River at the end of a long side road. To get there requires crossing four of the bridges that were knocked down during the storm.

The directions to Cedarvale are intriguing: take highway 16 north from Terrace, turn left at the road to Alaska, take the first left past the tracks, keep going until the end of the road.

Greenville, however, is least accessible of all. Going there requires a lengthy trip by four-wheel drive, a river crossing -- by helicopter or boat -- and, in one case, some crawling across ice floes.

Rosswood and Greenville, incidentally, revealed some of the unique joys of drawing samples under such conditions. Two sample points from Greenville happened to be crossing the river to Greenville just as ECRU's researchers were leaving. The groups actually passed on an ice floe. One of the Rosswood sample points had departed for a logging camp somewhere in the Queen Charlotte Islands.

This information is offered not as an apology to explain ECRU's return rate -- it was actually very high -- or to make one feel sorry for the research unit. (Disaster researchers expect problems.)

Instead, it is offered because it helps make understandable the attitude of

those who argued that there was not a disaster, in human terms. The conditions encountered by ECRU were found a month or so after the disaster. They were conditions many Canadians would regard as incredible. They are normal to those who live there.

The next sections deal, therefore, with the situation during the floods in these communities. They should be read with an understanding of how these communities exist in normal times.

Lakelse Lake

During the summer, Lakelse Lake is largely inhabited by campers and cottage dwellers. Its population swells into the thousands, many times the number who live there during the winter. But, in wintertime, Lakelse Lake is a dormitory community for Terrace and Kitimat. While one or two people run businesses from their homes and there is a snack bar, most of the area is residential.

The problems for Lakelse Lake bagan Monday when the winds started to disturb the lake. The rain started around 4 p.m. One woman found the weather conditions scary enough that she decided to stay the night with friends. The feeling of alarm was enhanced by a power failure and the noise of the rain pounding on the aluminum roofs.

By morning, Lakelse Lake was experiencing the beginnings of a serious flood. Water was running over a beaver dam in one of the creeks. There was flooding over the road to the lodge. And there was about a foot of water on the road by the restaurant.

The problem, at that point, was not rising water in the lake, which often floods, but water pouring down and out of the mountain streams. The melting snow and heavy rain had filled the streams to overflowing. In addition, some had leaped their banks and others had split or changed course.

One man living in a cabin by the lake found on Tuesday morning that the water was coming under his door. He decided to move some of his possessions. When he returned a bit later he found the cabin surrounded by water. A stream, leaving its normal bed, had split and surrounded the cabin.

As the warm weather and rainfall continued, the largest creek in the area soon became a highway for uprooted trees, dislodged boulders (they rolled

down the creek bed), silt and gravel. That had started to cause problems on Monday. By Tuesday it often created complete jams. Blocked from its regular course, the water streamed instead through the yards and driveways of local residents. By 1.15 p.m., the road crew from the highways department reported that 200 feet of the Lakelse Lake lodge road had gone and that 200 feet more had to be limited to local single lane traffic.

One problem created by the water is that it erodes the soil making trees and poles unstable. A high wind in the wake of a major downhill flood can sent trees and power lines toppling.

> When I came here 15 years ago, I cut every tree on my lot. The neighbors have trees. They fall down. Every tree you have is dangerous. Every year the power poles are broken.

As the situation began to develop, people began to take some action on their own. One woman went into Terrace to get her children from the elementary school. The principal let her take home her own children but did not act with respect to other children. But by late that afternoon, Lakelse Lake was effectively cut off as far as regular road travel was concerned. Persons coming back from work had to abandon their cars either at a nearby gas station or along the highway and walk into their homes. One man found himself knee-deep in water with trees crashing around him.

> I couldn't see where I was going. All I could do was follow the sounds of dogs barking.

Tuesday night into Wednesday the problems became worse. Some residents were kept awake by the now familiar sounds of the rain pounding on the roofs. But there were new sounds as well -- boulders crashing along the old and new creek beds, debris and logs banging at the houses as they were carried along by the force of the water. Some people found it nearly impossible to sleep. They got together for a drink to quiet their nerves.

By morning, one resident, alarmed by the growing flooding -- the lake was now rising steadily and adding to the flood threat -- decided to call the Terrace radio station and tell them what was happening. They took his name and phone number and passed the information to the RCMP. The police checked out the situation, found from others that it was becoming serious, rounded up some search and rescue people -- two of them with boats -- and began to respond. That action was formally authorized with a specific number by Provincial Emergency Program in Victoria. (The call was relayed from the RCMP to PEP in Prince Rupert to PEP in Victoria and back in a matter of minutes.) The Terrace floods, 1978, were now officially an emergency situation.

The officer who made the decision that PEP should respond is, as are many RCMP officers, a member of both the force and of search and rescue. Search and rescue is formally part of PEP. He decided the problems in Lakelse Lake required search and rescue response rather than police action. He was to spend the next two days working overtime without pay as a PEP search and rescue volunteer.

By mid-morning, when the search and rescuers had picked up the necessary supplies, there were more calls from Lakelse Lake for help and a number of persons had started taking their own precautions. People were moving furniture upstairs, hopefully away from the rising lake water. They were moving valued possessions to homes on higher ground. They were trying to create some kind of protection for the lake side of their homes, a side which was being battered in many cases by the rising lake waters and debris carried by the waves. (The wind had picked up again.) The precautions weren't always successful.

It surprised me in the way it was as bad as it was....
Every year it rains but nothing this bad.

I was surprised what a little creek could do, actually....

It made no difference because we didn't put it high enough. It was futile because it came up higher than expected.

In many cases, the water -- which climbed three feet in 24 hours, then another foot and a half in a couple of hours -- caught people by surprise.

Everything happened so fast. We knew it was bad but it happened so fast. Within hours, you could see it getting bad. The rain poured in buckets. Nobody knew it was going to get that high....

As Wednesday wore on the search and rescue group -- using, among other things, a rubber boat with a jet motor -- tried to get people to move out. A few did, but others declined to go. Sometimes they were simply frightened to move because the four-ffot high waves and the wind appeared more dangerous than their flood-threatened homes. The rescue group, as was the case in New Remo, became exasperated. They took risks to try and rescue someone who refused to be rescued. Later, when conditions became still worse for those endangered and the would-be rescuers the persons would call again for help, sometimes not to the R.C.M.P. but to the media.

(The family with the children refused to move more than once. Finally they had to be helped out partly by walking through flooded terrain.)

Wednesday night and into Thursday morning was the worst of all for Lakelse Lake. The water was now high enough that a cabin was tipped over, appliances in basements near the lake were flooded, boats floated off their trailers and, in one case, off into the lake. Belongings not rescued from basements were thoroughly soaked and sometimes ruined. (People later found various items had floated into their driveways.)

Gradually even the most reluctant found it necessary to find higher ground, or at least a house with a second storey. Even some of the homes that had been raised on high foundations -- supposedly above the flood level --

began to flood. At one home 15 people gathered on the second floor, sleeping on the living room floor, eating sandwiches, hoping the water wouldn't rise too far. The search and rescue team offered to move them but they preferred to stay. The power had gone -- it was cut for days in much of the area: they had to see by candlelight. Another couple faced with the power out decided to move into their trailer -- a comfortably furnished trailer with its own heat, its own water, its own lamps. They stayed there for three nights.

When the water receded and people started to examine what had happened they found many problems. The topsoil had often gone and the erosion had left trees without a stable base. Silt had got into the basements and into the water supply. Some items -- sometimes valuable equipment -- had simply disappeared. One family found computer parts labelled, "fragile. Do not get wet" lying in their now dry driveway.

> We had to clear up our whole lot....We had to hire two fallers to fell trees, two skidder operators to skid the trees out. We had to hire two carpenters to redo the place....
>
> The TV was ruined, the garbage cans lost. Water got into the house, the tiles are all loose now. The doors won't shut tight.
>
> We had a little water in the basement....There was damage to books and luggage. It was the creek that ran into the basement....
>
> What hurt me most was that I have a good library and I lost 275 of the best ones on the shelves.... Our plumbing and pumps were so full of silt we needed a new system. We shovelled the silt and dirt out with shovels.

> My property values have dropped $30-$40,000. That was about it really....I couldn't get my car out for a week.
>
> The water was brown and they said to boil it....I thought the sewers had backed up and he told me it was just muddy and I should boil it.

In some cases the families returned to find pet life left behind had been destroyed. One family lost a tank full of fish. The power loss also meant that some food in freezers decayed and that it took time for people to dry and clean out their houses.

As the weather became cold again some unforeseen problems also developed. All the sand that was on the water line washed away so that the pipes were exposed and froze.

New Remo

Much smaller than Lakelse Lake, New Remo is located about 10 kilometers west of Terrace, protected from the Skeena river by the Trans-Canada highway and the main CNR rail line. It is a varied residential community with a few, new, two-storey homes, some bungalows and a few trailers. There is an auto body shop and a carpentry shop but no stores, no offices and no restaurants.

The first storm problems hit New Remo just before noon Wednesday when the Zymagotitz River (known locally as the Zymacord) began to flood. At first the water hit only one corner of the community, furthest from the road and furthest from Terrace. As the day wore on it spread and continued to rise. New Remo is built in a depression so, as the flooding continued, the water rose almost as if it were flowing into a bathtub.

Of all the communities in the area, New Remo received the most attention.

The R.C.M.P., PEP and the volunteer fire department recognized that serious flooding would hit the community and issued warnings. The firemen, who came in mid afternoon, were there officially as part of PEP. Although acting independently of the R.C.M.P. search and rescue group at Lakelse Lake, they too had been assigned the official PEP number. The warnings they issued were part of an official PEP response.

Supported in person by the local PEP co-ordinator -- his official responsibilities cover Terrace -- the fire chief used a loud hailer to warn people to evacuate their homes or to at least move their cars to the highway, higher ground.

For many, the warnings were a prod to action. Seeing the flooding underway and hearing the repeated warnings, they began to act. Some of them moved their furniture upstairs. Some moved their things into homes on higher ground. Others rolled up their rugs and stored them away from what they hoped would be high water level.

And, bit by bit, some people began to evacuate. A volunteer fireman and his family moved into the fire hall. Others moved in with relatives. Sometimes the wife and children left and the husband remained behind. Before leaving many of them turned off their power: the fire department had advised them to do so.

One or two took special precautions. A man cut a hole in his living room ceiling then crawled into the small attic. He was almost deafened by the rain pounding on the tin roof. Another couple took some of their belongings to a jeep, parked it on the highway and spent the night there.

Those who stayed to see what happened were astounded by the speed at which the water came and at how high it rose. They had become used to follding but not that fast and not that high; and not in autumn.

> Nobody expected the water to rise like it did. I went and got my wife from work about 5 p.m. and there were a few inches of rain on the road. When I got back there was a foot and a half....
>
> You couldn't get out. There was water all over the road. We have never seen it that high. We have lived here for 21 years.

The Zymacord apparently reached its flood peak about 9 p.m. Wednesday night but for a while flooding continued. The peak water level in New Remo occurred about 2 or 3 a.m. Thursday, the middle of that night.

By 8 a.m. Thursday morning, the water had started to subside into the ground and people began to move back into their homes. One man who had left when there was three feet of water Wednesday evening reported he could drive right into his carport by Thursday.

When the residents did return, they found root cellars had been flooded, basements often still filled with water, furniture soiled and their living rooms covered with two to three inches of silt. Most spent a day or two cleaning up.

The Terrace area, of course, still had its problems but by late Thursday -- sometimes with the help of some blankets from the Salvation Army (gas supplies were still being restrained) -- most residents in New Remo were back fairly comfortably in their homes. For them, the storm had brought a flood which had come and gone. Their major troubles were largely over.

Old Remo

Old Remo is a small community of about 20 homes, 18 kilometers from Terrace. There are no stores or other businesses. Most of the families commute to nearby Terrace although some - especially one of the older ones - carry on their lives mainly in Old Remo. Although the community is not an agricultural one, there are some animals. Many of the families have chickens , . rabbits or goats. One family keeps horses.

As the crow flies, Old Remo is not that far from New Remo. In fact, at one time, the two were connected by ferry. Now, however, a trip from one to the other by car requires passing through Terrace and crossing the Skeena river by bridge.

The problems in Old Remo began somewhat later than those in the newer community across the river. They were also not so serious.

The first flooding began late Wednesday afternoon and by the time people were coming home from work there was water across the road. Later that evening it became more serious. Eventually it was bad enough that it washed out one of the three bridges in the community, cutting off a number of families by road from the rest of the settlement.

Though some people took precautions most of them - despite their experience with previous floods - got caught by surprise. As was the case in New Remo, they didn't expect the water to rise so quickly or so far.

> I came home about 6 p.m. and it didn't seem that bad. About 1 a.m., I was sleeping and some kid down the street...told me that the water was starting to come up... The neighbors on my left phoned me and told me they were going to evacuate their kids. They changed their minds because they

said the undercurrent was too strong. I walked ...and the water was up to my knees.

The water came up fast. I've seen a lot of high water but I have never seen this much. This was something like the '36 flood. The old timers that were here in the '36 flood. They figure it was about the same.

I came home about midnight and got the wife and kids up the hill to the neighbors and then came back. The road was under water....I brought the cows from the corral to the driveway. It was over your knees in half an hour....I was worried.

As the waters rose, some people decided to evacuate at least to neighbors. One woman looked after half a dozen children. Others moved furniture. Others tied things down. Others moved their livestock.

Around midnight, the family with the horses decided to move the animals to higher ground. When they started the move wasn't too difficult. Before they finished the horses had to swim. The water was up to their stomachs.

Some took precautions that didn't quite work. One man moved his truck and his snowmobile but not far enough. Both got caught by the floodwaters and were badly damaged.

As the night wore on some people gathered together in one home waiting and watching. Others stayed where they were. In one case the family estimated the water had crawled five feet up the side of the house. One and one half feet more and the water would have been coming into where they were.

Another family packed its bags ready to move if necessary and planted stakes so it could watch the water rise. The members then sat up and watched until the water finally subsided.

By the early morning hours -- around 2 a.m. -- some of the people in the area were becoming increasingly worried they might be trapped. They called to friends and relatives and finally to the R.C.M.P. asking for help.

At first, those receiving the calls didn't take them too seriously. But as they continued and the concern expressed increased they began to react. One man with a boat, who had been contacted both by relatives and by the R.C.M.P., came up to see what he could do. The water was so high he could cross farm fences by boat.

The next morning the water receded. The people discovered among other things a calf that apparently had survived even though the water mark was above its head. Its mother had apparently managed to hold it up. And a pig had -- to all appearances -- swum from a yard onto a verandah.

Although the flooding was over, Old Remo's problems weren't quite over. While the bridge was still out, fire hit one of the isolated homes. It burned to the ground. The fire equipment couldn't get there.

The Two Cedarvales

Like Old and New Remo, Cedarvale is a community split by the Skeena river. But while the split between the Remos is now decades old, the split in Cedarvale came quite recently. The results are a bit peculiar. On one side of the river -- the side where highway 16 runs -- is the only gas station and restaurant. Across the river is the only store. Even though the two communities are well within sight, just a stone's throw across the river, travel between the two is an hour-long drive.

For the purposes of this study, the two Cedarvales have been given separate names and treated as separate communities. The one lying along the main highway is called Cedarvale 16. The one across the river is labelled Cedarvale Over. The distinctions make sense:

the reaction to the disaster was quite different in each.

Cedarvale 16

The problems in Cedarvale 16 began when the phone went out on Monday -- it stayed out all week -- and the rains began to add to the water in the mountain streams.

On Tuesday, the people began hearing reports of washouts elsewhere and started to worry about possible slides. By Wednesday morning, some parents, at least, decided to keep their children home from school.

> Am not sending the kids to school today - our field covered with water. Creek across the road gone wild. Spent an hour trying to keep it from flowing straight across.

Wednesday afternoon, the situation deteriorated. One woman, hearing the rushing water, walked down the highway to watch flood-waters gradually tear the road away. Another family -- the only one whose home was severely flooded -- saw a creek pour across the main highway into their house. By late afternoon, the highway was gone. Shortly afterwards, the power went out. Since the phones were already gone, Cedarvale 16 was effectively isolated. It was also cut in two: one of the major highway washouts occurred between the main section of town and a home further up the highway.

Though some persons saw the problems coming there were no official warnings. The nearest came when a woman -- bothered by what she saw -- called the Kitwanga school and tried to get the principal to send children home early. He wouldn't.

Since Cedarvale 16 is on the main highway -- normally with easy access to other major communities -- most people there weren't prepared for isolation. Quite a few found themselves quickly going short on

supplies.

> We're out of meat, margarine, milk and tea -- soon coffee. No oatmeal...We're rapidly losing our supply of food except for fish and potatoes.

At the restaurant, where food supplies were adequate, the staff found themselves sharing with transients. The washouts had trapped a highway crew and some passers-by. Up the road, on the other side of the washout, a woman took in a transport driver and another highways employee. Surrounded by major breaks in the highway, Cedarvale became a haven for some of the isolated.

Despite the isolation the people did not pull together. Some people with food refused to share it with others. People with equipment did not help some who were flooded. Messages were not always passed along. A grocery list prepared for a rescue helicopter did not include everyone in town.

Partly because it was on the main highway however, Cedarvale, starting on Thursday, was visited by dozens of helicopters. Some came to fly out trapped highway crews. Others brought food or medical supplies. Some took out injured people or relatives of ill people, others took out electrical motors for drying or brought in generators to help keep freezers running.

Before the isolation ended a helicopter had brought in school books and another had returned some children from Terrace where they had been trapped away from home for more than a week.

Cedarvale Over

On the other side of the Skeena, in Cedarvale Over, the problems were somewhat similar but the community response was very different.

Cedarvale Over was not hit by any flooding; but it did lose its phone service on Monday and its power service twice -- from Wednesday night until Friday night and again for most of the day on Saturday.

It also suffered complete physical isolation. On Wednesday evening, just as men were coming home from work, the five bridges on the highway into the settlement started to get hit by flooding. Four of them collapsed or were washed away. Only the Mill Creek bridge survived.

One man, en route home, reached Wilson Creek and found it impassible. He turned back to discover the Kitwanga bridge had gone behind him. "The ground was disappearing under me." He spent the night with friends in neighboring Woodcock, wading home the next day.

With the power out and the rail line blocked -- Cedarvale gets mail and groceries by rail -- the town's people were unable to move, and with the phone out, mainly unable to communicate. The one link was a CB radio and -- unknown to most of the people -- a radio in the CN trailer used by a section crew.

Despite these problems, Cedarvale residents functioned quite well. They ran short of staples such as bread, milk and sugar but they shared what they had. They even moved frozen foods around to one freezer equipped with a generator so food would not spoil. Since many of them had already done their butchering and fall canning, their cellars were quite well stocked.

> We have coal oil lamps, a wood stove, always prepared for an emergency...
>
> We were much luckier than most people in the city

would have been if the same thing had happened...

not starving...it was nice and peaceful....

The one frustration was that one family -- listening to the sound from television on a battery-powered FM radio -- could hear broadcasts telling them to phone in if they needed assistance. They found the fact they could not phone annoying. They also found it irritating that they could see the many helicopter flights across the river -- one person counted 52 -- none of which seemed to come to them. (And, the flyers stopping for coffee in the restaurant on the main highway across the river.)

However, the helicopters did land in Cedarvale Over twice -- to bring in medical supplies (ordered via CB) and to pick up, then return with groceries.

The CB link also managed to get out a few messages about who was trapped in or out and about the fact that no one had been lost or injured.

And the helicopter managed to take care of the one serious problem: chicken feed for the chickens. Cedarvale Over, like many communities, ran out of feed before it ran out of food.

Cedarvale Over, like Cedarvale 16, is a mixed community, some old timers, some newcomers, some young Americans living a rural life-style. Unlike Cedarvale 16, people in Cedarvale Over all found it possible to share.

Rosswood

Although it has been identified as a community since its gold mining days in the late nineteenth century, Ro-swood doesn't appear that way to a passer-by. It consists of homes of varying quality strung along 12 kilometers of logging road or tucked away out-of-sight along two or three sideroads.

Some of the homes are really just one-room cainbs with no electricity, plumbing,

or the now usual amenities. The light comes from lanterns. The heat comes from a wood stove. Water is either taken from a well or gathered from the piddling tree, a pipe attached to a tree at the south end of the community. (The pipe has been covered by bark so it appears the water -- which comes from a stream -- actually comes out of the tree.)

Communications in Rosswood are also limited. One home, well removed from most of the community, has a radio-telephone. However, the school bus, which usually stays in Rosswood overnight on weekdays, also has a radio-telephone system.

But Rosswood's real isolation lies not in distance or communications but in the fact that the road to it is rugged and the people are there because they want their own, independent existence.

In the best of times, a drive from Terrace to Rosswood can be a strain. In severe weather -- the customary snow, fog or rain -- it is nerve-wracking. The road winds along a lake shore and below sharp ridges. The signs warning of potential rock falls mean what they say: the road is often littered with fallen stones and medium-size boulders.

Rosswood's problems began Tuesday when the always tough-to-drive road became more difficult than usual to drive and the streams by the road began to show signs of flooding. One man tried to go into Terrace in a half-ton truck but gave up the trip as too difficult. Another, more determined, did make it into town around noon on Tuesday in order to convince the local principal that the Rosswood children should be sent home from school early. The bus did leave but to get to Rosswood it had to take a roundabout route. While the driver struggled along that road the children tried to count the number of flooded spots on the road. One got 23.

That night was October 31st, Hallowe'en, and the people had planned a community get-together. One family -- way at the south end of the settlement --

had purchased fireworks and was planning a display for all the Rosswood children.

The parents further north talked it over and decided that such a trip would be too risky. They confined their Hallowe'en visits close to home. The fireworks were still unused a month later. As the children went from house to house on limited rounds that night, the parents talked about the continuing rain, the chance of flooding and the possibility of isolation.

The next day, Wednesday, November 1st, Rosswood was heavily hit. Rain and stream water flooded the pastures, making it difficult for animals -- and there are a lot of animals in Rosswood -- to eat. A creek at the south end of town overflowed, making movement difficult. A woman who had driven to see a friend had to walk home through water. (She had to get back because she had a roast in the wood stove.) And a torrent of water ripped across the highway at one point taking out a bridge and sweeping away a new home. The people living there were away; they had not been back to see the damage several weeks later.

> I saw his house down...personally it was one huge mess. The field, barn, house was wiped out. His house was 150 feet off its foundations.

In addition to the major damage, there was flooding at spots all along the road. Some of the local men -- calling in on the school bus radio-telephone -- asked for and got permission to dig out some of the culverts to try and control the flooding. One man in particular was concerned because the water was drifting off the road into his home.

Late that day one couple walked from their house to the major creek that was flooding and tearing up the road. They saw it filled with logs and debirs. At one point it grabbed a tree which had become anchored by its roots and spun it around. The tree, spinning like a helicopter rotor, ripped out trees in a full circle around it -- a vivid example of the power of the raging water.

The flooding and the isolation weren't a worry to many in Rosswood. They expect some problems and are usually well-prepared. But on Wednesday afternoon they discovered they had two cases of illness. One child was running a fever of 104 degrees farenheit. Another had an inflamed mouth. Since there is no medical unit in Rosswood, it was felt both should to hospital.

Using the radio-telephone in the school bus -- the other phone was now out-of-reach of most of the town since it was beyond the major washout -- first one person then another called the R.C.M.P. and demanded assistance. The police offered to do what they could but it wasn't much. Despite a personal visit from a police officer, the most experienced helicopter pilot -- after checking the weather -- refused to fly. The police considered trying to get in with logging equipment but decided that would be difficult if not impossible. They had thought of floating some equipment as close as possible by lake.

The police decided they would have to wait until morning. They had made the same decision about the man with the broken neck, lying in the back of a pick-up truck near Cedarvale on Highway 16.

That response -- it seemed nothing was being done -- angered the people in Rosswood, the first of several angered periods they were to experience. They felt their needs were being ignored.

While the residents of Rosswood were angry at outsiders they were co-operative among themselves, quick to help each other and to share. Four separate men -- using four-wheel drive vehicles and horses -- travelled about the community seeing what people needed and what others could share. One woman rode across flooded land on horseback to deliver milk to a family with children. Most people reported they could make do. All were willing to share; the one problem was feed for animals.

> We could have lasted three months or longer. We could have survived for years up here. There is nothing in

town that we needed that we couldn't do without.

Other than not feeding the pigs, cat, dog, it didn't create any great hardships.

It didn't affect me any. We always have lots of food in supply. We have flood problems every four or five years though not as bad as this.

We had enough food. I keep lots of dry stuff. We don't have power. We did lose stuff in a root cellar elsewhere, carrots, potatoes, onions, turnips...400 pounds of vegetables...

We were prepared for winter. We would probably be isolated. We just happened to have our food in.

When the water came, everybody here just banded together. There weren't any outside volunteers. We had to help ourselves until the roads were through again....I don't think we'll see the likes of that again.

The next morning helicopters did come in. One of them brought some relief supplies -- supplies not needed -- including paper napkins, luncheon meat, plastic spoons, one pound of coffee, weiners and juice. It's still not clear where those supplies came from but they added to the irritation of Rosswooders toward the outside. The other flight picked up the one youngster and a parent. The child with the high fever was feeling better Wednesday morning. Her parents decided not to send her to hospital; the child who did go in was taken to hospital, treated and released about half an hour later.

Friday morning, despite the sharing, the people decided they could do with some groceries and especially with some animal feed. After consultation, the supplies were ordered from a store and PEP called and asked to see they were delivered. PEP informed the caller -- the woman who runs the Rosswood store -- that animal feed was not a top priority.

The following day, Saturday, another medical problem arose -- a child with an eye infection. When a helicopter arrived the locals tried to persuade two of its occupants -- both from CBC -- to get off and allow the sick child and parent to get on. They refused. The Rosswood residents became very angry. They phoned in again -- the radio-telephone was getting constant use. Another helicopter came out just before dusk and took the child and her father into Terrace.

Meanwhile, in Terrace, a part-time resident of Rosswood had called and volunteered to take out the food supplies. By that time the back route was open to the bridges near Rosswood. He drove out to the bridges and some residents met him there and carried the food across the washouts. Rosswood residents, as usual, had banded together to look after their own needs.

The animal feed eventually did arrive. The day it came -- just after it was carried across that same break -- the regular route was declared open. A few days later -- after a 10-day holiday -- the children were able to get back to school.

For Rosswood, the flood had meant some damage -- one home destroyed, some isolation, some medical problems but, above all, a sense of community. Within the community there was a sense of sharing. But there was considerable anger at the outsider. It was a sharp contrast to Cedarvale where help from the outsider seemed to be viewed as satisfactory: the anger was reserved for fellow residents.

Greenville

Originally, the village of Greenville was on the south (Terrace) side of the Nass river. Around 1900, however, it was moved to the north side, a move which may have reduced the danger of flooding but also made the village less accessible. Now the trip from Terrace or Aiyansh requires a helicopter or float plane or a drive and trip across the river by boat. It's a trip that's particularly difficult in spring or fall -- when break-up and freeze-up block the river. It's somewhat easier in winter when you can drive or walk across the ice.

The present village -- rebuilt in 1922 -- consists of 54 older houses and some new homes plus a store, a medical unit, an Anglican church and an elementary school. The houses are mainly bungalows and in most can be found six to twelve members of an extended family. The homes range from modern and immaculate to somewhat battered and untidy. A few have been abandoned.

There are about 90 children in the community, most of whom attend the local school. However, each day -- if weather and ice conditions permit -- 15 head across and up to Aiyansh to a senior school. In bad weather these students are billetted in a tribal group home in Aiyansh.

For most who live in Greenville employment is seasonal and sporadic and it often takes people away from the community. Most of the men work in logging or on fishing boats. (The boats are usually rented or they act as crew.) Women who want work usually leave the village to get jobs in the canneries in Prince Rupert and area.

Unlike communities such as Cedarvale or Rosswood, however, Greenville has a fair number of services. There is a store in the village run by the band council. There is a medical unit with a resident nurse. The dental technician for the area lives in Greenville. There is a community centre and a resident R.C.M.P. officer. And, of course, there is the elementary school. Most homes

are equipped with electrical appliances and running water. There is one radio-telephone in the town and a community-wide CB system that serves both as a public address service and a community telephone. Most people also have TV so they can watch the weak signal from Terrace. There are few radios: the reception is not worth it.

Although there were no formal warnings of the problems that hit the community, the R.C.M.P. officer noticed the melting snow and heavy rain and on Monday began to worry about a flood. Tuesday morning, he suggested to a number of people that they move their cars off the south shore landing (a landing which later did flood.) The boatman who ferries people back and forth across the Nass river echoed that warning.

That same day two youths went off to hunt above the village -- Greenville is surrounded on three sides by mountains -- and saw high water in the creeks and a washed out bridge. They returned to discover water running onto the playing field by the school and close to the door of the community centre. They notified those at the band council (the councillors were away) and efforts began to protect the town. Some persons dumped gravel in an attempt to divert the overflowing creek. Others moved two old pick-up trucks into the creek bed hoping that would divert the water.

The efforts may have helped but by Tuesday afternoon water was running across the playing field and into the basement of the community centre. It also hit the school. When it receded it was discovered that salmon had been caught in the football nets. The children were able to go and pick up the stranded fish.

Tuesday afternoon, the students returning from Aiyansh managed to get across from the south side to Greenville. But there was flooding at the south landing. The next morning the CB community radio announced there would be no river travel that day. The Aiyansh students would not be able to get out.

The flooding, however, was just the first of Greenville's problems.

Late on Wednesday, the power went. It was to stay out until late Saturday afternoon. That meant most of the homes were without light and heat. It also meant the radio-telephone was gone and the town was without external communication. Most CB's also would not work, cutting local communication. By then the road -- one of the ones that services Rosswood -- was no longer passable and the landing on the south side was flooded. Greenville was cut off both physically and in terms of communications.

For a few people, it was just like the old days; many had stored food in freezers -- most go into town to shop once or twice a month -- and most, expecting some annual isolation, had supplies on hand. For others, things became difficult. They huddled in blankets on the floor. They made do with what food they had. And they watched their freezers gradually warm up until food stocks started to spoil.

> We were running short of food. Nothing specific. Just everything. We were low on everything. We hadn't gone into Terrace for supplies as the flood prevented us from going.

One woman was in especially bad shape. Her mouth which had been causing her pain became gangrous. She had some medical attention including drugs but she needed treatment in hospital. Wednesday, when communications were still open, no plane could come in. Thursday, it was impossible, for a while, to ask for help. Finally someone rigged up a transceiver to a battery and managed to reach a nearby community. A plane came in under the clouds and got the woman and her husband out.

(It wasn't an entirely happy rescue. He found himself stuck in Prince Rupert forced to pay for his expenses and for the flight.)

That same day, Thursday, November 2nd, the situation became still worse. A mudslide hit the town's water supply, making the water muddy and reducing the

pressure. Those in the town were afraid that in case of fire they wouldn't have an adequate water supply. (It was fire that destroyed the village in 1922.) The low pressure also meant toilets wouldn't work properly.

> We were without water for more than a week. But we are always ready. We have our stove, our kerosens lamps and I had about a dozen candles left from our son's wedding.

> There was hardly any water coming out of the tap. Just a trickle. There were a lot of people having diarrhea and different stomach conditions. There was a lot of dirt in the water and just to be on the safe side we boiled it....

While some had supplies, others didn't. The teachers hadn't received their propane stoves and kerosene lamps -- supposedly part of their regular supplies. They had to double up and share. And some found the isolation and the lack of communications -- the TV signal had also gone because a tower had blown down -- just plain boring:

> There was no place to go. We just stayed home all the time and sat around and played games, cards, monopoly. My dad had a propane stove. We had our supper earlier because we had no lights, just candles, so we could see what we were eating.

While no one starved in Greenville -- many do their own fishing and hunting and stockpile food -- some did go short. People ran out of fruits and vegetables. And some of the freezers -- some people have as many as four in their home -- failed. The food began to decay.

The band councillors -- all 16 of them -- found themselves outside the community during the crisis, first in Prince Rupert then, later, in an effort to get home, in Terrace. When the weekend came, they decided to use band funds to purchase food stocks. PEP, as it did for others, agreed to ship in the food free of charge. The supplies arrived in time to irritate some of the local residents. They thought it was charity. The council later billed PEP for the food. PEP refused to pay.

The isolation continued in Greenville for more than a week. The power went back on Saturday. But the roads weren't finally repaired for about 10 days. The children finally got back to school by crossing the river when the flooding receded and using a logging vehicle to make the trip to Aiyansh. They then stayed there until the roads were open again.

The Relief

Under the laws of British Columbia, the responsibility for flood control and flood relief fall under the jurisdiction of one person, the Minister of Highways.

That is made clear by the Flood Relief Act of 1948 and the regulations passed as Annex B to that act on June 29th, 1955.

As it happened, then, the man legally responsible for a response to the Terrace floods was in Terrace, able to take charge when the flood problems arose.

The earlier description of highways operations makes clear that the minister did fulfil his obligations.

The regulations passed under this act also make clear that the provincial emergency organization -PEP (the Provincial Emergency Program) - is part of the minister's organization when it comes to dealing with flood relief. The act and the regulations - section 6-1 - state that PEP's organization "shall be placed at the disposal of the minister." PEP, in turn, has the right to call upon other provincial agencies such as health, welfare, agriculture etc.

Any description of the provincial response to the Terrace floods must, therefore, be understood in this legal context.

The operations may have taken place under the auspices of some specific department such as human resources but the direction and control was essentially part of the overall emergency structure - PEP - and PEP was working as the administrative arm of the Minister of Highways.

The fact that so many of the problems were highways oriented made it seem quite reasonable that the minister and his staff should play a leadership role. The facts, however, are that that was not only logical and sensible it was legal as well.

In examining the response to the floods, therefore, it seems reasonable to look only at two agencies - at the police (who were involved in the original emergency and the original public liasion) and at Highways or PEP or whichever name is applied to the provincial response system that developed as a direct result of the flood damage.

The Police

During the peak disaster period - Wednesday through Thursday morning - the area's one police agency, the R.C.M.P., was deeply involved in what was going on. Officers were involved in rescue work and warning in two of the three flooded communities. They were involved in dealing with the major accidents and with a medical emergency. And they acted as the main centre of information for the public and the mass media.

On the whole, however, the disaster did not place an enormous strain on the R.C.M.P. detachment at Terrace. For one thing, the major relief responsibility was undertaken by others, mainly by the provincial highways department and PEP. For another, there was a reduction in some normal police activities; the main highways were not operating, eliminating the highway patrol and sharply reducing accidents. For a third, the disaster, if anything, brought on a reduction in crime. And finally the disaster was, as discussed later, an economic event, not one readily dealt with by a police force.

The first major police involvement began Wednesday morning when one officer responded to the calls from Lakelse Lake (relayed by CFTK) and began to organize search and rescue activities in that community. His involvement certainly began as a police officer - the original call reached him while he was on duty. But he viewed his response as part of search and rescue, aprt of PEP, and declined to charge his services to the RCMP.

Later that same day, a number of other officers became involved, along with PEP and fire personnel, in warning the residents of New Remo that they were going to be hit by flooding. During the late afternoon and evening, the officers warned the residents to evacuate or at least move their cars. They continued to monitor the situation until it ended.

But the major police involvement was not as an active search and rescue or warning agency but as a collector.

On Wednesday evening and on through the night as the disaster developed the police became involved as well in three major incidents: in the accident near Cedarvale which involved two men, one with a broken neck; in the medical emergency reported at Rosswood; and in the train accident to the west which took the lives of two CNR employees.

In each case, the police found they were fustrated in their efforts to deal with the events as they might have in a non-disaster situation. Because road travel was impossible, they could not dispatch either a police car or an ambulance to the scene. Because flying conditions were impossible they could not persuade a helicopter to go in. Even when access to the rail accident was secured by rail, the police were a bit frustrated in their response: the handcar used would not hold both police and medical personnel; the officer investigating decided his presence was of lesser importance.

During the night on Wednesday into Thursday the police considered a number of alternative ways to reach Rosswood, mainly because they received a number of calls complaining about their apparent lack of response. Among other things, they considered taking a logging vehicle part-way by barge then driving it the rest of the way. They finally decided to wait until the weather cleared in the moring and then gave the accident and Rosswood first priority on the morning helicopter flights.

All these activities, important though they may have been, did not match the stress on the detachment created by the incessant phone calls from both local citizens and the media. The calls, which started late in the day on Wednesday, proved too much for the regular officer to handle and they were turned over to a civilian employee.

A little earlier, the detachment made another major decision - that the media calls from outside were going to be a major strain,

possibly too difficult for the detachment to cope with. They invited two local reporters to move into the detachment office where they could hear all that was going on. In return for this total involvement, the two reporters took care of replying to all outside media calls.

The tactic - discussed between the police and the media sometime earlier - appeared to work to the satisfaction of all. The police felt relieved to be free of the media. The local reporters were pleased to be in on the ground floor. And the outside media praised the system stating they were given real assistance when they called, provided in a way that suited their needs.

They were a few minor difficulties. The media, on one occasion, released some information the police wanted held. They also - once or twice - attributed a change in information to the police rather than to the difficulty of obtaining information. On balance, however, the system worked extremely well and left both parties more than satisfied. The police and the media would both be content to try a similar plan again.

The happy relationship between the police and the media was not matched by an entirely satisfactory feeling between the police and the highways department. During the day on Wednesday and into Thursday, the police, when they felt it necessary, issued reports to the media about highway problems and closures. They also passed on the latest information supplied by highways. Eventually, to get rid of persistent callers they asked the media to announce that all highways were closed until further notice.

The highways department is inclined to think it should be making such announcements and was somewhat disgruntled at times with the feeling its priorities were taken over by the R.C.M.P. A meeting was held sometime after the disaster to work out an arrangement satisfactory to both.

Once the peak disaster period had passed, the R.C.M.P. became less and less involved. Except for following up on the various accidents and attending one meeting at the municipal hall, the police had very little to do with the disaster follow-up. Their activities settled into a normal, even less-than-normal routine.

PEP

The most difficult thing about the Terrace floods to describe in clear-cut terms is the role of the Provincial Emergency Program, PEP.

That's not because PEP was not actively involved.

Instead, it's because PEP was involved in so many ways, through so many people, that it's difficult, quite often, to sort out what precisely was PEP.

In retrospect, it's clear that PEP's first involvement was in the form of a quiet but persistent watch of the river level of the Skeena at Terrace. That watch was kept by the city engineer, the local PEP co-ordinator, and his staff.

That watch convinced the local PEP co-ordinator that Terrace itself did not face a flood danger. That perception was accurate and it meant that the possibility of a major disaster was played down by PEP as a local, Terrace agency.

In fact and in retrospect it is quite clear that the decision not to give an unnecessary alarm -- a decision which was quite sound -- was a legitimate one. But it's also clear that this decision was seen outside Terrace as a lack of action.

(Quite often, hasty, inaccurate warnings have simply damaged the credibility of agencies to the point their real warnings are less heeded.)

The second major PEP involvement took a different form.

It began when the local radio station at Terrace called the R.C.M.P. detachment to report it had been told of serious flooding at Lakelse Lake.

After checking, the R.C.M.P. decided to respond and it did so not as a police

unit but as a search and rescue unit, as part of PEP. Most of those involved were from PEP's active and well-organized search and rescue group at Terrace. And by mid-morning they had official status from PEP's headquarters in Victoria.

(The authorization from Victoria came as a result of a call relayed from the R.C.M.P. in Terrace to the secretary in Prince Rupert to Victoria and back.)

The search and rescue unit continued its activities at Lakelse Lake for the next two days eventually looking after most of those who needed help. Its frustrations -- many refused, at first, to leave -- have been described elsewhere.

The third major PEP involvement again involved the local PEP co-ordinator and, this time, the R.C.M.P. and the local fire department.

As the situation worsened at New Remo -- which is part of Terrace -- the PEP co-ordinator, the R.C.M.P. and the fire unit all decided that warnings needed to be issued to residents there.

What emerged at New Remo was a combined operation, partly R.C.M.P., partly PEP. (The firemen present had been authorized to respond as part of PEP as a result of a second call to Prince Rupert and on to Victoria.)

PEP's fourth involvement -- again locally -- began the following morning when it became clear that the flooding had left some travellers stuck in Terrace. Others, including hitch-hikers and motorists, were stranded at various points along the highway.

The local PEP co-ordinator, working from City Hall, decided at that point to ask local people to provide billets for those stranded. This request was broadcast as a paid announcement on local radio and a flood of offers poured in.

(This decision was not taken in consultation with other agencies such as the R.C.M.P. and it led to some disagreement.)

But the most important decision -- the one that caused some major misunderstandings -- was the decision that, except for providing billets, PEP did not need to make any major response to the smaller communities in the area.

It was the view of the local PEP co-ordinator that most people in the smaller communities such as Rosswood were used to being isolated, used to looking after themselves, quite able to make do on existing supplies.

It was the view in Victoria -- one supported by the demands being made by the highways minister in Terrace -- that a much more major response was needed.

The result, inevitably, was a conflict and, rather quickly, the arrival in Terrace of a number of PEP people from elsewhere in the province.

During the days that followed it was these people -- in some cases assisted by local PEP personnel -- who organized the major PEP response.

The outsiders arranged for food and medical supplied to be flown into the various isolated communities. They arranged to fly out and dry motors from electrical appliances. They arranged for school children to be returned home and school books to be flown to those stuck away from their classes.

As a result of some flying visits made to a number of the communities, they made some assessments as to what was needed and what was not.

One decision was that all food would be flown in at government expense but that the recipients would have to order what they wanted and pay for the actual cost of the food. (That decision later caused a disagreement with the band council at Greenville who wanted PEP to pay for the food arranged

for by the senior persons in the band.

(PEP did -- as elsewhere -- pay to fly the food in. It refused to pay for the food itself.)

While the PEP outsiders -- eventually working quite closely with local PEP volunteers -- carried out these missions, the local human resources personnel -- again functioning as part of PEP -- arranged billets and handed out food vouchers to those who appeared in need.

The issuing of food vouchers appeared to cause no problems. These ranged from a few dollars to $25 or $40, sometimes $25 for several persons for the weekend, meals usually paid for only until the needing could be moved into billets.

Accommodation proved more of a headache.

In the immediate need to look after people, some of those trapped or evacuated were placed in hotels at public expense. Once the college dormitories were available, those requiring accommodation were placed in the college.

The problems arose because some of the earlier persons who obtained relief were either not moved or were reluctant to move and some of those needing relief later objected because they felt the, too, should be entitled to hotel accommodation.

In one case, human resources more or less surrendered on its policy and provided a night's hotel accommodation to a particularly demanding family.

Eventually most of the people who had been trapped and/or evacuated left Terrace by air or on roads as they opened. Even at the peak, human resources, acting as part of PEP, looked after only about 100 persons.

The Role of the Media

Presented the way it is in this report, the information about the Terrace floods sounds very much like a clear-cut story of a steady and obvious build-up towards an emergency situation.

This may well have been the case.

But it does not follow that anyone in Terrace or elsewhere was in a position to see that at the time.

Most of the events described in this report took place in compartments.

The logging companies, for example, closed down their operations without consulting anyone, without feeling the need to tell anyone what had happened.

(It's true the various company despatchers told those who asked how bad road conditions were but it's also true such calls were infrequent.)

The railway coped with the various problems along the tracks -- including the derailment of a passenger train -- without asking for or receiving help, without notifying anyone about what had happened.

(There may have been some communication with particular customers but this would have been on an individual basis rather than in some comprehensive way.)

The gas company, aware its line along the Copper River might be in difficulty warned its own staff to keep an eye on things. But it did not communicate its fears to others.

The schools, faced with increasingly bad road conditions, stuck on the whole to central command and control. There was some consultation with highways but basically the schools stayed open -- as is their habit.

This is not to say no co-operation existed.

The railway did -- as required -- notify the R.C.M.P. that a fatality had occurred.

The telephone company and the power company did -- as makes sense -- share common problems and share equipment for dealing with them.

The police did -- as one would expect -- notify a number of others about problems affecting them: road blockages, a tree down by the tracks, power lines down, etc.

But there was no one central agency receiving all this information, adding it up and reaching the conclusion that serious overall problems were developing.

An examination of the interaction between the various companies, agencies and departments involved suggests that they tend, on the whole, not to communicate their difficulties to each other. Instead, they prefer to work on their own.

(This is not to suggest this is bad: it may, in fact, be the direct result of the competence of those involved in doing just that.)

The examination of interaction and communication does, however, suggest that two places did, in fact, become central receivers of information.

One was the helicopter companies. The other was the media, particularly the local radio station, CFTK.

As has already been described, the helicopter companies were essential to an emergency response.

They were needed by the police to rescue the injured and the ill, by PEP to

carry supplies and medicine, by the gas company to move crews, supplies and pipeline. They were needed by telephone and power for access to isolated problem areas, and by highways to move crews and equipment and survey the terrain.

The demand for helicopters was such that the companies found themselves having to pick and choose among regular clientele -- a situation that embarrassed them and, in one case, damaged a long-standing commercial relationship.

(A company cancelled an agreement because it decided another flight took priority.)

But the media -- though they could not provide a physical service -- were just as important.

It was the media that first called the attention of the police to the extent of the flooding at Lakelse Lake, prompting the initial PEP response.

It was the media that reported the gas problems triggering the incredible co-operative public response.

It was the media that alerted the public about the breakdowns on the highways and the collapse of the rail line.

It was the media, by carrying all these accounts, that convinced many in the area there was, indeed, a real disaster.

Media over-reacted? At the beginning, ECRU believed they did. Usually they do. In this case, no.

A number of individuals told ECRU that it was only through hearing media reports, which listed most of what was happening, that they became aware how widespread

the problems were.

A careful examination of interaction and communications reveals that the media -- next to helicopters -- were the target of the most communications from others.

The gas company called to announce the gas problems and the need for public co-operation.

The power company reported its difficulties and asked people to understand that difficulty of access made it difficult to get repairs done.

The phone company listed its problem areas and tried to correct the inaccurate reports (outside Terrace) that phones were out generally.

The R.C.M.P. reported specific problems -- including highway closures -- and even invited the media into its offices to keep up to date.

The highways department provided regular reports on each specific incident, often calling the media before calling anywhere else.

PEP kept themedia well-informed about its operations even to the point of using the media to invite individuals to phone in if they needed help.

The schools used the media to advise parents that their children were being billetted in private homes.

The weather office kept the media regularly informed about the weather -- though in this case the calls usually originated with the media.

In many cases this information flow was a commercial relationship. Many of these announcements -- despite their direct relationship to the emergency -- were actually paid advertisements.

(The custom of paying for such announcements was stopped by only one company. Its senior staff decided that such public information was news and should not be paid for. Most others simply paid the going commercial rate for their announcements.)

The media thus became the key element in keeping the community and, equally important, the key response agencies informed about what was happening overall. They, more than any other agency, put together the overall picture.

The role of the media extended beyond Terrace.

Media reports across the country -- through the major wire service, Canadian Press, and through the CBC and CTV network facilities -- made the Terrace floods major national news.

Decision makers in Victoria and Ottawa became aware that there was a crisis in the B.C. interior. When requests came through for a response the senior elected and appointed officials were at least in part aware of the problem.

Locally, the media played an even greater role.

As mentioned earlier, the first real request for help came to the R.C.M.P. when individuals in Lakelse Lake first called the media. This sort of situation continued through the emergency. Many individuals continued to call the radio station -- which is seen as a vital community service -- when they wanted personal attention to a particular problem.

While this suggests the media played a vital role, it should not be interpreted as meaning that the role was played faultlessly.

As has been seen elsewhere, the media managed to make a number of errors in reporting the initial problems that occurred.

Reports of the train accident were inaccurate on most media for some time. Some reports had a slide knocking the train into the river. One had two trains involved.

As mentioned earlier, CP reports that telephone service had been severed caused some problems for the phone company.

And the accuracy of the reports was not helped by the agencies involved. One company managed to put out a memo to assist the media that itself contained serious inaccuracies.

There was one other gap in media coverage that may have greater long-term consequences.

On the whole the coverage was concerned with the big bang aspects of the floods. It dealt with the people who were flooded, the bridges that were washed away, the severing of the pipeline, the railway being shut down and the death of the two railwaymen.

It dealt with stranded travellers and with missions of mercy, including flights of food and medical supplies.

It covered this part of the story completely and accurately.

(The initial inaccuracies did not alter the basic perspective of media coverage.)

What the media did not do was cover the overall economic effects. It did not deal with loggers who were laid off, shipping companies who ran into extra costs, lumber companies who had to re-route their shipments, railway workers who were laid off, hydro, telephone and gas crews who made a great deal of overtime pay, and helicopter firms who were doing a roaring business.

In short the media left out a great deal of the story.

(This was not true for all media: the daily newspaper in Prince Rupert did, in fact, carry detailed coverage of the economic effects. Its coverage in this area was substantially different from all other coverage reviewed.)

What this means is that the decision makers in Victoria and Ottawa heard only about certain parts of what happened, not the whole story of the impact of the floods. They then based their decisions on this limited information.

(It is ECRU's understanding that various official reports tended to correspond to media accounts. The official reports also did not detail the overall economic effects.)

The media therefore performed an essential public service in making the community aware of the overall nature of what had happened. But they distorted that picture, not by being inaccurate, but by being incomplete.

This finding and its many implications has already been reported in an earlier paper: "The Media and the 1978 Terrace Floods: An Initial Test of an Hypothesis".

Conclusion

It is possible to argue quite convincingly that the Terrace floods of 1978 were not a disaster, at least not in human terms.

Most of those directly affected by flooding -- people in Lakelse Lake, New and Old Remo -- are used to flooding. This one may have come at a different time and with a little more severity than usual but it was still a flood.

The reluctance of many to leave their homes indicates that they did not see the incident as particularly threatening.

Secondly, most of those in the isolated communities such as Cedarvale, Rosswood and Greenville are used to isolation and prepare for it.

The people in Rosswood, for example, normally have no running water, no gas supply, no power, no telephones. It was the presence of a radio-telephone in a school bus that made the situation in Rosswood unusual, not the absence of other communications.

The people in Greenville -- living across a river which, at times, is impassible -- are obviously attuned to isolation. And some of the precautions they took, such as moving cars away from the dock, indicate that to them flooding is normal and expected.

The literature on disaster makes clear that problems which spell disaster to one community do not, necessarily, mean disaster to another. People develop, given experience, the capacity to cope with the most severe events. There is, in short, what might be called a disaster culture.

Given this, it is not surprising that some in Terrace, once it was clear Terrace itself was not threatened, viewed the problems of the people in the area as not at the disaster level.

It is our view that this conclusion is understandable but unacceptable.

It seems to us the floods were, in fact, a disaster.

They brought death to two people, injury to a number of others, and danger to many people in different communities.

(The fact that school buses continued to move children along weakening highways and over unstable bridges is enough to suggest the potential for danger and death was present in a substantial way.)

The floods disrupted community life in the area. They prevented some people from reaching medical attention, others from getting their medicine (except through emergency flights.)

They stopped some from reaching their place of education or employment. And they forced, as a result of the pipeline break, a partial closing of schools.

They damaged or destroyed many community services, some of them considered essential. They wrecked the ground transportation system, both road and rail. They interfered with other major utilities -- the water system (water had to be boiled), power and telephone service.

Finally, the Terrace floods severely disrupted the economy. They caused layoffs and loss of employment, and forced businesses and industries to cut back or shut down. A diversion in Canada's grain trade was forced.

In our opinion, the Terrace floods of 1978 were, in fact, a disaster.

There is one other important finding that emerges from the evidence in this report.

The floods did not come really as a flash or unpredictable situation. The record now shows they developed over time

The problems began on Monday with warm weather, melting snow, wind, rain and the first signs of difficulties -- power outages and disruptions in the phone service.

They continued on Tuesday with continuing bad weather, including a record rainfall, plus a series of other indications that difficulties were at hand: washouts, a disruption of the logging industry, flooding, a train derailment from a slide.

By Wednesday, given further washouts, increasing flooding, still record rainfall, more slides, etc. it should have been clear to anyone with this evidence that the Terrace area was possible facing major disaster conditions.

Yet it appears no one did anything specific. There was no attempt to issue a general warning.

Why?

There appear to be all kinds of reasons why no warning was issued, some of them familiar now (ECRU has encountered previous similar problems), some of them apparently new.

The first reason no warning was issued is the standard one: people find it hard to believe that they are actually in a threatening situation. Disasters happen to other people.

In previous studies, ECRU has seen people in a gas-filled building remain until it blew up, people in a burning building ignore an alarm and, sometimes, smoke and flames, and people in a threatened community ignore all the signs

of an impending mudslide.

Terrace, in some ways, is no different. The people in the flooded communities who declined to evacuate -- despite warnings from the R.C.M.P., PEP or the fire department -- are exactly like those who have been examined in earlier research.

The second reason why no warning was issued in Terrace is that there was no one central data collection place where the evidence of what was happening could be assimilated and interpreted.

Environment Canada, for example, put out its regular forecasts but did not try to interpret that data and make it meaningful in terms of, for example, flood warnings. Some data -- such as weather records from Cedarvale -- were not even being passed on at the time. They reached Terrace weeks later.

The R.C.M.P. was not receiving information about the various problems, mainly because many of them were not police matters or were not seen as such.

The logging companies did not pass on news of their closing down to the police because this was not a police matter. The railroad did not inform the police of high water or even the derailment because this was not a police matter. The gas company did not inform the police of its concerns about the pipeline because, again, this was not a police matter.

The police, in short, were not the recipients of information about what was going on.

Some matters were, of course, referred to the police. The railway called the police about the fatalities. The media called the police about actual flooding. Individuals in communities such as Rosswood called the police about health emergencies. The highways department called the police about highway

breaks and those injured. And the police, in turn, because of their highway patrols, were able to notify others of problems and thus, to some extent, remain informed.

ECRU's data suggests that PEP was in an even worse position than the police insofar as making any overall assessment is concerned.

PEP was in none of these communication systems. As far as could be learned, none of the involved agencies -- power, gas, telephone, highways, the railway -- kept PEP informed. Even the R.C.M.P. failed to call PEP locally when it activated a search and rescue unit.

There were only two agencies that appeared to be in touch with the overall picture and both of these really became involved only after the situation reached emergency levels.

One was the media, radio station CFTK.

The other was the various helicopter companies. They could not help but realize from the flood of demands for their services that disaster had struck. But they, like the media, got these calls after the fact.

There was no general warning in the Terrace area, therefore, because there was no one agency in possession of sufficient information to make it appear that such a warning might be useful.

The only agency that seemed to be in touch with most of the affected agencies was the media especially radio station CFTK. And the station got most of its information after the major problems had developed, rather than during the development period.

Why did the various agencies not pass along the information to some central point or share it so they each would begin to realize how serious a situation was developing?

There appear to be three answers.

One was that no one agency saw it as its own responsibility to gather overall information. Therefore, no one agency did.

A second is that no one agency had established itself as the obvious central data collection point.

A third and more important reason appears to be that individual agencies involved saw the problems as ones they could best deal with themselves. They did not need outside help and did not think such help would be useful.

Only when they were stuck did they seek aid.

Thus the railway -- until the major breaks -- looked after its own problems with its own crews. It did not go outside for help.

The gas company notified its own staff and only its own staff. It saw no purpose in alerting others because there was nothing for them to do.

The power and telephone companies co-operated where they shared joint facilities but only in those places. And neither shared their concerns with other agencies -- except, on occasion, highways -- because the expertise necessary to restore service did not rest with anyone else.

In a sense, then, the fact that all the agencies were able to deal with their own problems themselves meant that sharing was minimal. Individual agency competence would appear to be a most effective barrier to sharing.

At some stage, the judgment would have to be made by the local planner. Presumably, there would be sufficient evidence to indicate an emergency was developing. The planner would then have to activate local emergency procedures and local agencies capable of passing on and acting on a warning -- the R.C.M.P., the media, etc.

If Environment Canada were prepared to provide local interpretations -- the United States weather service does do much more of this -- then the first role could be filled by Environment Canada. Since this seems unlikely, we believe it would best be done by PEP and similar organizations in the other provinces, but through a local PEP organization.

A number of the agencies with whom this idea was discussed raised the question of whether an emergency co-ordinator could really understand the problems of individual agencies. They wondered if the individual agencies would, in fact, provide the information necessary for such an evaluation. They suggested many individual agency officials would merely grunt "no problems" or "routine maintenance" when asked if there were difficulties. We agree that such a system would take time to become effective, but without a check there are even less possibilities for co-ordination.

A number of events which took place after the disaster struck suggest, as is often the case, there are few difficulties in responding to a disaster once its presence has been established. These include the leadership role taken by the minister, co-ordination of relief and rescue activity by highways and PEP working together, resolution of radio problems by the helicopter pilots, planning and co-ordination at the hospital, and public response to requests for billets. The problems associated with disaster come at the prediction and warning stage, not at the post-impact and recovery stage.

Economic Effects

ECRU did not examine the compensation program developed after the Terrace floods to aid tho-e who had suffered property damage as a result of the disaster. That was not our mandate.

ECRU did, however, gather a fair amount of information about the overall economic effects other than property damage.

What emerges is that a disaster has widespread and varied effects. As mentioned in the introduction to this report and in the section on the economy, it seems clear disaster means losses to some, gains to others, and leaves some untouched.

Two other points emerge.

First, the compensation program does not touch all aspects of the disaster. Many of those affected, by loss of work or business, for example, are not compensated by government. It would appear some receive neither government nor private relief.

Second, the fact that compensation is uneven may be -- and we emphasize the "may" -- one result of the fact that the economic effects are not apparently widely evaluated or reported in the mass media or in government documents.

What this suggests to us is that it would be worthwhile for a future ECRU research project to examine the overall economic effects of a disaster. A comparison of these effects with those that are reported should also take place, followed by an assessment of whether the decisions about public and private compensation stem from the reporting process rather than reality.

Since the Terrace floods occurred roughly a year ago, ECRU has had some time to develop these ideas. They have been discussed with economists who have worked in the area of disasters, and with others with an interest in disaster

research. We hope something will come of those discussions.

Is there any solution?

It would appear to us that the Terrace experience makes an overwhelming case for effective emergency planning at the community level, planning that includes some sort of effective local data gathering system.

Developing an adequate evaluation and warning system for the Terrace area would, in our opinion, require two components:

. a regular local evaluation of weather data based on accurate, local weather data; and

. a systematic collection of problems from the various local agencies, sufficient to ensure that a build-up would be noticeable.

In our view, the first part of the system -- the local interpretation of weather -- if done properly -- could provide a reason for the local emergency planner to get in touch with agencies in his or her area. He or she would have something to offer.

In return for that evaluation service, the various local agencies would provide an assessment of their daily problem list -- enough to allow the emergency planner a chance to make an overall assessment of what was happening.